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ABSTRACT

This study describes an approach for enhancing reading strategies through the use of technology for improving reading comprehension and vocabulary. The targeted population consisted of middle school students in a growing low to middle class community, located in central Illinois. The problem of declining reading scores was evidenced in data reported in documents compiled by Illinois State University and Illinois State Board of Education, Local Criterion Reference Test, growing numbers of Title I students based on teacher referrals, and teacher observational checklists denoting levels of student reading style and habits. Analysis of probable cause data revealed that students reported a lack of skills related to comprehension and vocabulary, which can be broken into the four areas of management, curriculum, biological, and environmental. Faculty reported student inability to read for understanding at grade level in the different content areas. A review of solution strategies suggested by professional literature, combined with an analysis of the setting of the targeted schools, resulted in the selection of three major categories of intervention: utilization of reading strategies with a focus on comprehension and vocabulary, incorporation of appropriate software, and integration of reading strategies into other subject areas. The post intervention data indicated an increase in the reading scores of students after utilizing a variety of software applications that incorporated reading strategies across the curriculum. By integrating the technology with the reading strategies, students demonstrated a transfer of knowledge in all content areas. Contains 26 references, 10 figures and 4 tables of data. Appendixes contain interview sheets, observation checklists, cooperative learning models, a list of software, worksheets on reading strategies and thinking skills, and various class activity sheets. (Author/SR)

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ED 433 500

Improving Reading Strategies

Through the Use of Technology

Mary Lange
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Linda Norman
Noelle Upchurch

An Action Research Project Submitted to the Graduate Faculty of the

School of Education in partial Fulfillment of the

Requirements of the Degree of Master of Arts in Teaching and Leadership

St. Xavier University & Skylight Professional Development

Field-Based Masters Program

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ABSTRACT

This study describes an approach for enhancing reading strategies through the use of technology for improving reading comprehension and vocabulary. The targeted population consisted of middle school students in a growing, low to middle class community, located in central Illinois. The problem of declining reading scores was evidenced in data reported in documents compiled by Illinois State University and Illinois State Board of Education, Local Criterion Reference Test, growing numbers of Title I students based on teacher referrals, and teacher observational checklists denoting levels of student reading style and habits.

Analysis of probable cause data revealed that students reported a lack of skills related to comprehension and vocabulary, which can be broken into the four areas of management, curriculum, biological, and environmental. Faculty reported student inability to read for understanding at grade level in the different content areas.

A review of solution strategies suggested by professional literature, combined with an analysis of the setting of the targeted schools, resulted in the selection of three major categories of intervention: utilization of reading strategies with a focus on comprehension and vocabulary, incorporation of appropriate software, and integration of reading strategies into other subject areas.

The post intervention data indicated an increase in the reading scores of students after utilizing a variety of software applications that incorporated reading strategies across the curriculum. By integrating the technology with the reading strategies, students demonstrated a transfer of knowledge in all content areas.

CHAPTER 1

PROBLEM STATEMENT AND CONTEXT

General Statement of the Problem

Students in a targeted fourth grade class and a seventh grade class exhibit inadequate reading skills. Evidence includes the number of students identified for special services, existing school records, and teacher-made tests. The fourth grade will now be referred to as "Site A" and the seventh grade will be known as "Site B".

Local Setting

Site A

Site A's facility is a historic intermediate building that is home to a diverse community of approximately 700 students in grades four through six. This includes nine sections of each grade mixed in a heterogeneous setting along with three self-contained classes for a total of 29 classrooms of students. The school population is comprised of 98.3% White, 0.3% Black, 0.6% Hispanic, 0.7% Asian/Pacific Island and 0.1% Native American students. The low-income students are from families receiving public aid, living in institutions for neglected or delinquent children, being supported in foster homes with public funds, or eligible to receive free or reduced-priced lunches. Low-income students comprise 38.4% of the population. The attendance rate, which is defined as the number of students in school, is 95.9%. Student mobility, which is defined as the number of students who are enrolled in or leave the school during the school year, is 10.4%. Chronic truancy rate, which is defined as the percent of the students who are absent from school without valid cause for 10% or more of the last 180 school

days, is 0%. Average class size, which is defined as total enrollment for a grade divided by the number of classes for that grade reported for the first day in May, is 25.4. Eighty-eight percent of students live within the school boundary lines, which includes a variety of subdivisions. The remaining 12% attend Site A for either a special needs class or a written request based on personal needs. All students at Site A will feed into Site B upon entering junior high school.

Site A has approximately 60 staff members who are the academic caretakers for these students. The staff is 98.4% Caucasian. The other 1.6% is comprised of Vietnamese. Twenty-three percent of Site A is male with the remaining 77% female. The staff has taught an average of 16 years. Fifty-six percent of the staff population has bachelor's degrees and 44% have their master's degrees. The school office personnel is comprised of a principal, administrative intern, secretary and clerk. There are 47 certified staff members who have direct involvement with these 29 classrooms. This includes classroom teachers, inclusionary teachers, learning center teacher, physical education, music and art instructors. Twelve educational assistants support them. Special services are staffed by a school counselor, nurse, health clerk and drug education officer. The school also has nine individuals who are responsible for both the lunchroom and playground.

Site A is located in a residential area very close to the downtown business section of the community. This hundred year old brick building houses the 29 classrooms on three different floors. In addition, the school contains two gymnasiums, one large cafeteria, a learning center, which is a combination media/library, and an auditorium that seats about 500 people. The district's main

offices, along with the district's technology center and Internet hub are also located in this facility.

Site A students are exposed to the core subjects as mandated by the state. In addition to language arts, math, social sciences, physical education, music, and art, all students are involved in a technology curriculum that includes keyboarding, word processing, spreadsheets, and research presentation. A gifted program is available for the top 3% of the school population. A majority of special education students receive services using an inclusionary philosophy. Three special needs classes, which include behavior disorder and community-based instruction, are self-contained. Any student receiving a free or reduced priced lunch is eligible for Title I services. All students can be seen engaged in hands-on activities, cooperative learning, and thematic units.

Site B

Site B is located in a residential area on the north side of the community. The single story brick building, which is nearly 40 years old, includes 30 classrooms, two gymnasiums, one cafeteria, and a learning center, which serves both as a media center and a library. A primary school is attached to the junior high facility on the north side of the building.

Site B has a total enrollment of 457 students. The population is comprised of 98.2% White, 0% Black, 0.9% Hispanic, 0.9% Asian/Pacific Islander and 0% Native American students. The low-income students are from families receiving public aid, living in institutions for neglected or delinquent children, being supported in foster homes with public funds, or eligible to receive free or reduced-priced lunches. Low-income students comprise 27.4% of the population. The attendance rate at Site B, which is defined as the number of students

attending school regularly, is 94.5%. Student mobility rate, which is defined as the number of students who are enrolled in or leave the school during the school year, is 12.5%. Chronic truancy rate, which is defined as students who are absent from school without valid cause for 10% or more of the last 180 school days, is 1.2%. Average class size, which is defined as total enrollment for a grade divided by the number of classes for that grade reported for the first day in May, is 26.9. The same boundary lines apply to Site B as they do to Site A.

The staff at Site B is a 100% Caucasian. There are approximately 40 staff members, 24% being male and 76% female. The average number of years taught is 12. Seventy percent of the staff population have bachelor's degrees and 30% have master's degrees. The school office staff is comprised of a principal, administrative intern, one secretary, and one clerk. There are 34 certified staff members who have direct involvement with these 30 classrooms. These staff members include classroom teachers, inclusionary teachers, learning center teacher, physical education, music, communications, and art instructors. Three educational assistants support teachers in these classrooms. A school counselor and nurse staff the special services.

A team comprised of a math, social studies, science, and language arts teacher delivers the core curriculum of Site B, which is mandated by the state. All students receive a technology curriculum that includes word processing, spreadsheets, database, and desktop publishing. Gifted language arts classes are offered to students in the top 3% of the school population. An inclusionary philosophy is used for all special education students when applicable. Each team of teachers believes in and applies cooperative learning, thematic units, and hands-on activities to their everyday curriculum.

The Community Setting

The targeted community consists of approximately 35,000 people. The community site, located near a major river, is centrally located between Chicago and St. Louis. Several manufacturing and service oriented corporations along with a new federal correction facility impact the community. The community has a mall, library, local hospital and park district.

Forty percent of the targeted population is within the low-income bracket. Medium household income in 1989 was $27,128. Employment in the community is comprised of service oriented jobs, manufacturing, skilled labor and government jobs. Unemployment rate of this community is 6.2%. Site A school is established in a neighborhood of single-family homes and multi-family dwellings. The neighborhood embodies six churches. The neighborhood is made up of lower middle to upper-middle class families. The average sale price of a single family home is $80,000. Site B school is located in a neighborhood of single-family homes and multi-family dwellings. The neighborhood houses four churches. The area includes families of both lower-middle class to middle class socioeconomic status.

The community's educational structure has a dual district school system, which consists of one high school district and one grade school district. The high school district serves grades nine through twelve. Currently this district has two separate campuses. The community, in an effort to combine the current two-campus structure into one campus, passed a bond referendum for this district. This new facility will open in the fall of 1998. The targeted elementary district is pre-kindergarten through eighth grade. This district has a staff of over 300

members and approximately 4,000 students. The district is organized into ten schools. There are six buildings for kindergarten through grade three, two intermediate buildings for grades four through six, and two junior high buildings for grades seven and eight. This district is nationally recognized for its use of technology in the classrooms and its Asynchronous Transfer Mode Technology (ATM) network. The district, recipients of both state and federal grants, created Learning Community 2000 which unites the school with local businesses in making technology accessible to every community member. This cooperative effort on the part of the school district and its business partners resulted in this district being named "1997 Elementary Technology School District of the Year" by the National School Board Association.

Community issues that are prevalent now are the high school dropout rate, school consolidation, and the issue of tax caps. Due to young mothers, single parents, grandparents raising grandchildren, and a poor home environment, a serious issue of concern is the additional need for early childhood programs. Economically, the business development sector of the community is striving to bring additional businesses to the area. The community is concerned about perceptions of racial tolerance and lack of sensitivity. An effort to deal with these perceptions is ongoing.

National Context of the Problem

The problem of declining reading scores has been addressed at the national level and the state level. "Over 40% of fourth graders performed below basic on the National Assessment of Educational Progress (NAEP), that is they did not demonstrate understanding of 4th grade level texts. Ten percent of 4th graders did not participate in the NAEP, because they could not read well enough to take it" (Foorman and Fletcher, 1998, p. 3). This drastically affects students' ability to perform in all of their subject areas. Reading is essential for success beyond the classroom walls also. "And few would disagree with the prediction that the gap between the U.S. workforce's current literacy levels and the level required by technological advances will increase dramatically in the next decade" (Foorman, 1998, p. 8). Educators are gravely concerned with the declining reading scores. The Illinois Reading Summit convened by the Illinois State Superintendent of Education made six recommendations for improving reading instruction, which was the top priority (Lenski, 1998). The Illinois Goal Assessment Program (IGAP) is a measure used universally throughout Illinois public schools to evaluate students' academic performance. The media is equally concerned as stated in the *Schools that Succeed on the IGAP Reading Test* by Lenski. The media continually report that students are not prepared to enter the work force with their current reading ability. "When the media reported the decline of the IGAP reading scores, public concern mounted"(Lenski, 1998, p. 6).

Students can learn to read if given appropriate instructional reading strategies. "The Board of Directors believes that no matter what the cause of the declining scores, the teaching of reading in Illinois can and should be

improved"(Lenski, 1998, p. 8). Researching the effectiveness of new strategies utilizing technology will assist the classrooms in this improvement. The National Reading Research Center (NRRC), a consortium of the universities of Georgia and Maryland, said, "The engagement perspective assumes that in order for children and adolescents to develop into fluent, adult readers, they need to acquire motivation, strategies, knowledge, and social interaction" (Baumann and Duffy, 1997, p. 9).

"In spite of advancements in our understanding of the reading process, reading instruction has advanced very little beyond the type of instruction provided for students 30 years ago" (Baumann and Duffy, 1997, p. 10). A reading lesson today looks and sounds much the same as it did in the 50's. Reading is still primarily taught during reading or language arts time in both targeted sites. However, our target population is very different from the classrooms of the 50's. Students today are not motivated to read or write. We know that students need to be motivated to reach their potential in any area of life. Students must be given strategies that motivate them to succeed in reading.

Consistency is essential in implementing effective strategies. "Reading skills and strategies can be taught effectively and efficiently when instruction is systematic and integrated with quality children's literature" (Baumann and Duffy, 1997, p 5). "Teachers of regular education and teachers of special education, Title I, and ESL need to unite forces and work towards preventing reading difficulties"(Foorman and Fletcher, 1998, p.3). There are regular education, special education, and Title I students in both of the targeted sites. Utilizing strategies in all subject areas of the curriculum provides a consistency that will embed these strategies more effectively. Teachers, who are well prepared for

classroom instruction, will have engaged reading students. A middle school teacher needs to strive to manage her class in a well-organized, structured manner (Reed, 1991). The well-prepared teacher utilizes a continual array of alternative plans when the need arises to meet reading objectives. Gardner's Multiple Intelligences make teachers aware that the classroom is filled with a variety of learning styles. This must be taken in account to meet all of these needs.

John Dewey said we must educate the whole child. When teaching reading, this must be ever present in all strategies. Technology is a strategy that "has the potential to change the way we view and teach reading and writing"(Baumann and Duffy, 1997, p. 28). All targeted classes in both sites have technology available for teaching reading, so it will be a strategy to which all students have access. Technology is motivating and can be used in a variety of ways to address the different needs of the learner. It can be used to read multiple documents to compare and contrast, to evaluate and analyze, to think like "historians", to build background knowledge, and to set a purpose for students' reading of texts (Baumann and Duffy, 1997). The decline in reading scores is of national and state concern. New reading strategies in technology to address this problem need to be considered.

CHAPTER 2

PROBLEM DOCUMENTATION

Problem Evidence

In order to document and assess the reading levels of the targeted fourth and seventh grade students, several assessment instruments were used and were administered to the whole class. Site A consists of three fourth grades classes with a total of sixty-four students. Site B consists of one class of seventh graders with a total of twenty-nine students.

These assessments were given over a three-week period at both sites A and B. A teacher interview was developed by the researchers (Appendix A) to aid in the documentation of classroom reading deficiencies. A student survey was developed by the researchers (Appendix A) to collect background knowledge related to the problem. A sampling of items from standardized tests were compiled to assess students' current knowledge of comprehension and vocabulary.

The teacher interview was administered to fourth and seventh grade teachers from both sites. The student survey was administered orally to the targeted fourth grade classes at Site A. The targeted class at Site B, a seventh grade class, completed this survey independently. In addition, students from the targeted classes at both sites independently read and answered excerpts chosen from standardized tests. The results of these tests are shown in figures one through four.

Students from the targeted classrooms of Site A and Site B were given portions of a standardized reading test. This pretest was administered with consistent directions and guidelines that the researchers all agreed upon ahead of time. The results are displayed in the figures below.

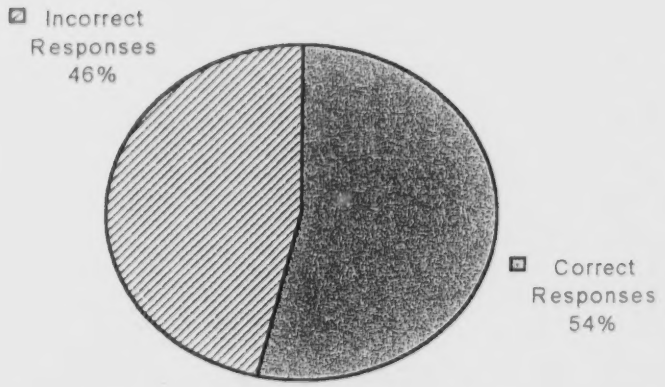

Figure 1.-Site A The targeted 4th grades' responses to the reading skills pretest.

Figure 1 shows the total number of responses for Site A of the targeted fourth grades. There were 64 students who took the pretest, which consisted of fifteen questions. These questions covered various reading skills such as main idea, supporting details, drawing conclusions, predicting, cause and effect, and vocabulary. Results showed that a little over 50% of all questions answered were correct responses.

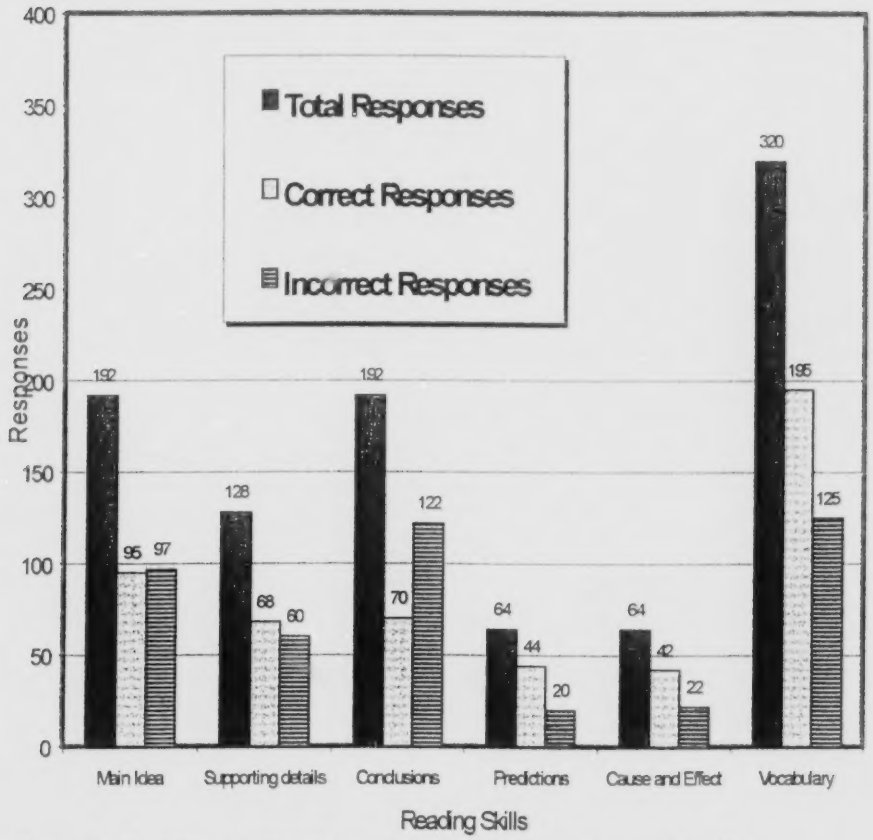

Figure 2 -Site A The number of correct/incorrect responses for reading skills of the targeted fourth grade classes.

Figure 2 shows the specific reading skills that were tested in the targeted fourth grades. While comprehension questions such as main idea and supporting details were about equal in correct and incorrect responses, students showed a declining score for drawing conclusions. Approximately a third of the students were unable to answer questions with regard to prediction or cause and effect. In addition, over a third of the questions based on vocabulary were incorrectly answered.

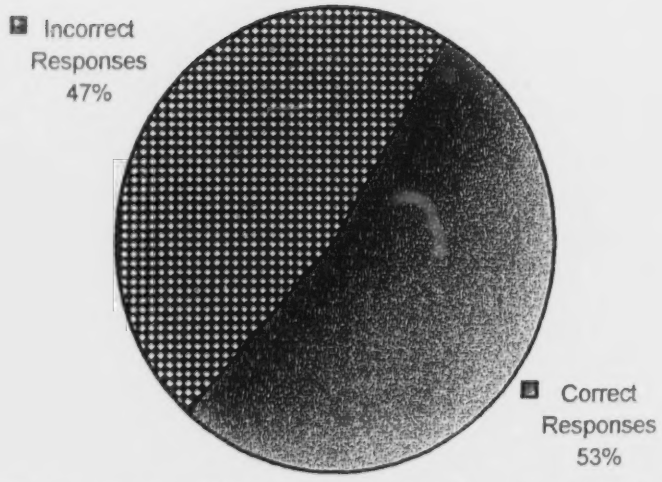

Figure 3. The targeted seventh grade's responses to the reading skills pretest

Figure 3 shows the total number of responses for Site B of the targeted seventh grade. There were 28 students who took the pretest, which consisted of twelve questions. Skills covered in this pretest were supporting details, drawing conclusions, inference and vocabulary. Results show that slightly better than half of all responses were correct responses.

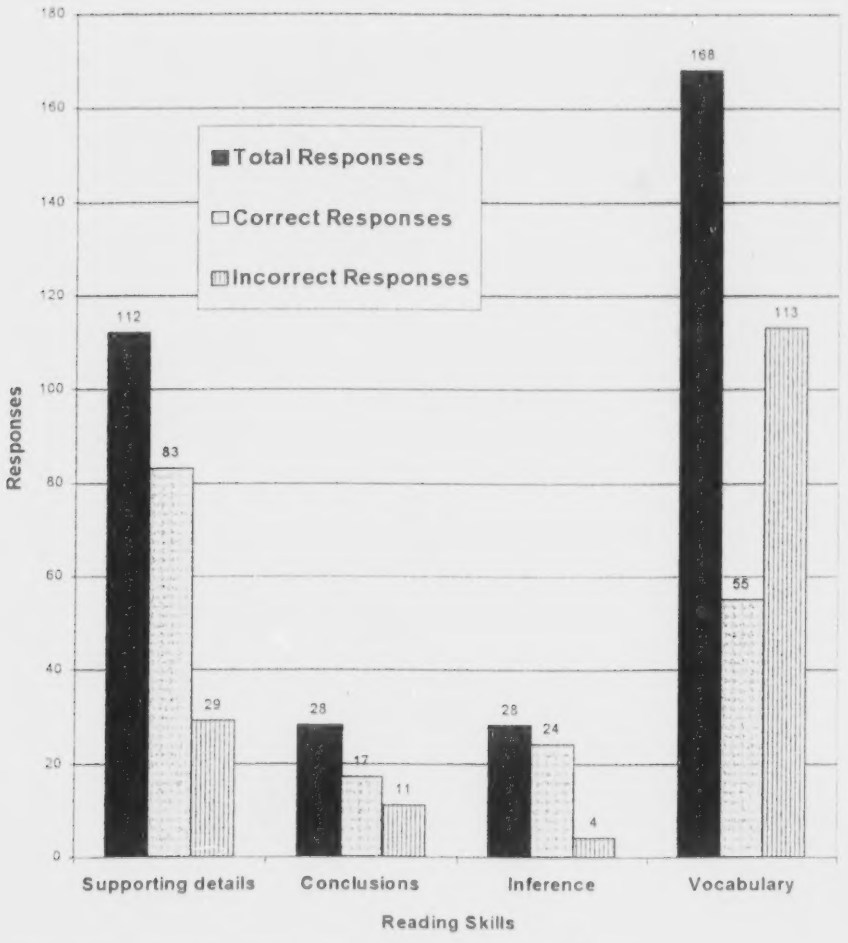

Figure 4. The number of correct/incorrect responses for the targeted seventh grade class.

Figure 4 indicates that the majority of students in the targeted seventh grade class mastered the questions dealing with supporting details and inference. They were not as successful with drawing conclusions. This targeted group experienced the most difficulty with vocabulary.

Part of the data collecting process included teacher interviews from the targeted grade levels. Interview information was given to nine fourth grade teachers and twelve seventh grade teachers. A total of twelve interviews were returned. Questions and responses are as follows:

1. What reading strategy do you see students struggling with most frequently?

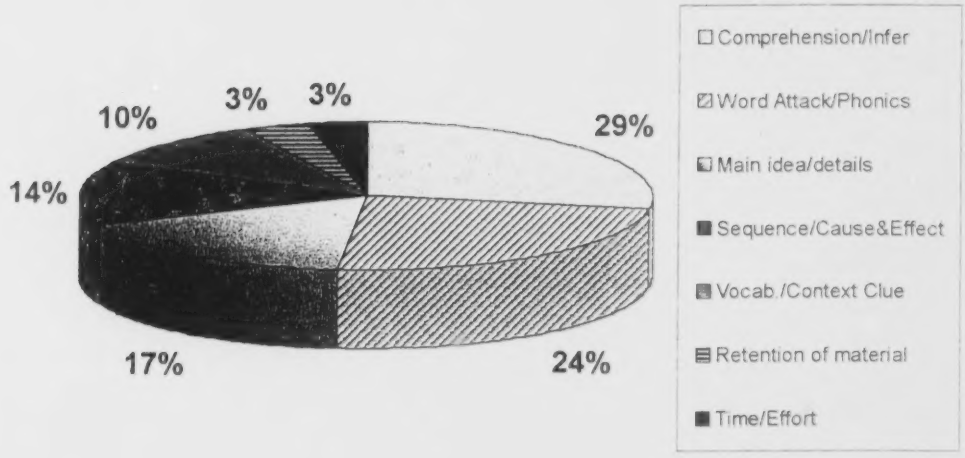

Figure 5. Teacher responses to weak reading skills.

Teachers both at Site A and Site B report that comprehension and understanding inferences is a struggle for students. In addition, students show a weakness when it comes to word attack skills and an understanding of basic phonics. The data show that retention of what was read along with time and effort weren't as significant.

2. Do you feel a student needs to be a good reader in order to be successful with incorporating technology?

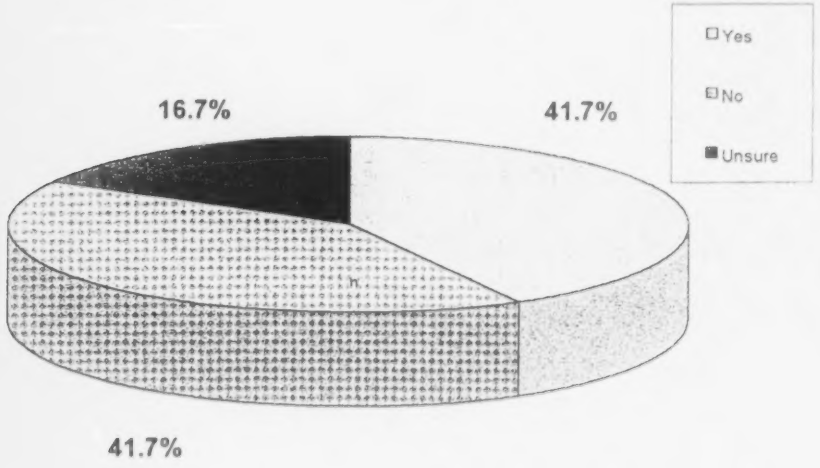

Figure 6. Opinions of teachers regarding the necessity of good reading skills when incorporating technology.

Teachers were split in their opinions. Teachers responding yes to this question feel that too many software applications are dependent on "bells and whistles" and the students are unable to read the screen. In addition, it was felt that students have a tendency to skip the actual reading and focus on the game part of the program. Teachers felt that in order to do researching and authoring a student must be at least an average reader. Teachers who answered no to this question feel that many poor readers find greater success using technology and some of the software does not require reading. Those that marked uncertain stated that the integration of technology and reading depends on the actual program. Software applications vary from visual to text. If there are clear-cut

objectives and goals, these teachers feel reading can be enhanced with technology.

3. Do you think computer programs have helped your students with their reading skills?

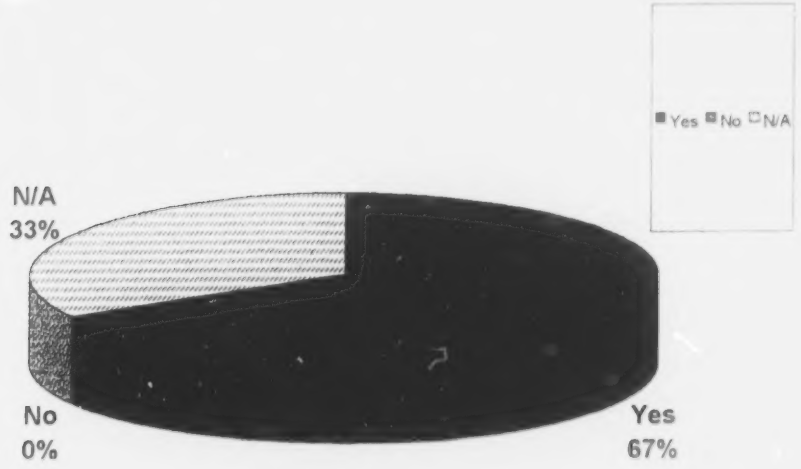

Figure 7. Opinions of teachers regarding the importance of computer programs teaching reading skills.

The majority of teachers interviewed felt that computer programs did indeed help students with their reading skills. Motivation was the key factor. However, these teachers also felt that if students didn't read the screen carefully, they may miss important information. Due to lack of computer access or experience with many reading software programs, four of the teachers did not have enough background or experience to give a yes or no response.

4. What type of assessment do you do in your classroom on a regular basis?

   The majority of teachers report that they use a combination of multiple choice, matching, short answer, and true/false when assessing student's knowledge of the subject matter. Few reported using higher order thinking skills when assessing student work.

5. What kinds of problems do you see with the transfer of reading skills into other subject areas?

The teachers, who were interviewed, felt that the transfer of reading into other subject areas is crucial to students' understanding of that particular subject. Responses indicated that reading is necessary for all content areas. In addition, it was felt that some students were unable to achieve in other subject areas due to poor reading skills.

The survey that was administered to the targeted students at both sites is documented in the Tables 1 and 2. This survey identified the students' use of reading strategies.

Table 1

Site A Student Responses to Self-Assessment Survey

	Always	Sometimes	Not very often	Never
1. When reading difficult paragraphs, I study the graphs and tables.	20%	40%	26%	14%
2. When I want to find a topic in a book I look in the Table of Contents or Index.	51%	32%	13%	.05%
3. When reading I underline or highlight important words.	14%	23%	28%	35%
4. When reading I carefully look at the first sentence in each paragraph.	23%	40%	20%	17%
5. When reading I stop and think about what I just read.	18%	52%	22%	.80%
6. When reading, I read every word rather then skipping parts of the paragraph.	57%	27%	14%	.02%
7. When reading I say the words quietly to myself.	47%	32%	16%	.06%
8. After reading something difficult, I put it in my own words.	23%	36%	14%	27%
9. When reading I look at the headings and bold print in books.	35%	43%	.10%	.11%
10. I look at the Table of Contents and Chapter headings of books I read.	40%	27%	25%	.08%

Table 1 illustrates inadequate use of reading strategies by the targeted fourth graders. The majority of students indicated that they use reading strategies inconsistently. This survey shows the percentage of students that use each strategy.

Table 2

Site B Student Responses to Self-Assessment Survey

	Always	Sometimes	Not very often	Never
1. When reading difficult paragraphs, I study the graphs and tables.	14%	50%	18%	18%
2. When I want to find a topic in a book I look in the Table of Contents or Index.	46%	39%	.04%	11%
3. When reading I underline or highlight important words.	.04%	32%	39%	25%
4. When reading I carefully look at the first sentence in each paragraph.	14%	57%	14%	14%
5. When reading I stop and think about what I just read.	.07%	68%	18%	.07%
6. When reading, I read every word rather then skipping parts of the paragraph.	50%	39%	11%	0 %
7. When reading I say the words quietly to myself.	32%	29%	32%	.07%
8. After reading something difficult, I put it in my own words.	18%	50%	11%	21%
9. When reading I look at the headings and bold print in books.	43%	46%	.04%	.07%
10. I look at the Table of Contents and Chapter headings of books I read.	39%	29%	25%	.07%

Table 2 illustrates inadequate use of reading strategies by the targeted seventh graders. The majority of students indicated that they use reading strategies inconsistently. This survey shows the percentage of students that use each strategy.

Probable Causes

Review of the literature indicates there are a variety of causes for inadequate reading skills among many of today's students. Time is one major factor. With an expanding curriculum which includes the teaching of academic, behavioral and social skills, valuable time is taken away from core subject areas. Classroom teachers find it difficult to accomplish course content objectives in the given amount of minutes allotted to each class (O'Neil, 1995). "With less time for instruction, it's not surprising that reading scores have suffered" (Bradley & Sack, 1997, p. 21). In addition, teachers are spending more time with classroom management that interferes with the learning process of reading.

Another cause for low reading skills is the lack of student interest to achieve their highest potential. It is reported that our country is facing an underachievement epidemic. According to the Carnegie Corporation as cited in Educational Leadership,

> Make no mistake about it: underachievement is not a crisis of certain groups; it is not limited to the poor; it is not a problem afflicting other people's children. Many middle and upper-income children are also falling behind intellectually. Indeed, by the fourth grade, the performance by most children in the United States is below what it should be for the nation and is certainly below the achievement levels of children in competing countries (p.18).

Schools must accommodate the many diverse learning styles found in each classroom. The traditional school has always taught in one mode that was

thought to benefit all students. Using only one learning style will not address underachievement of these students. Another approach to blend with learning styles might be to use Howard Gardner's theory of multiple intelligences. This theory indicates that not all students' learning potentials are being addressed. "It has helped some elementary schools to create a professional culture that is more focused on student learning" (Viadero, 1998, p. 15). In order to maximize reading potential, the reason for students' underachieving needs to be identified.

Class size plays a vital role in students' academic performance. Smaller class sizes have proven that more effective learning takes place. When school districts that put more money into instruction were researched, their class sizes were smaller and achievement was higher (Keller&Viadero, 1998). A teacher's attention can be focused primarily on the individual needs of each student with a smaller class size. Furthermore, reducing the pupil-to-teacher ratio would minimize the on-going remediation programs in the upper grade levels (Achilles, 1998). Due to budgetary constraints, however, class size continues to increase.

There is strong evidence that indicates the traditional models of learning and the types of technology used are often ineffective (New times demand, 1998). Some software applications do little more than electronically turn pages for the passive learner while other programs get caught up in the bells and whistles with reading not being the primary focus (Lucker-Harrington, 1998). Software is being purchased with little or no focus on curricular integration with reading skills. It's also believed that if an application holds a child's attention, the software program is teaching reading to the student (Lindsay & Kaufman, 1998).

At the same time, technology is foreign to teachers who lack the proper training in use of the hardware, the capability of the software, and how to integrate it into their curriculum. Some teachers lacked interest in the multimedia environment or had reservations about the enormous amount of effort they had to invest (Cohen and Holzman-Benshalom, 1997). Many see this as an added burden to their already busy workload because the average school day does not provide the time to integrate these tools effectively.

A universal cause of concern is the student's inability to develop their reading vocabulary to become fluent readers. The most common cause of difficulties acquiring early word reading skills is weakness in the ability to process the phonological features of language (Torgesen, 1998, p. 33). Educators assume that teaching basic phonics skills will in itself develop these skills or that children eventually become proficient readers through maturity. However, research indicates that "...74% of the children who are poor readers at the end of third grade will be poor readers in the ninth grade" (Torgesen, 1998, p.34). Not all students have the ability to transfer their understanding of the verbal language to the printed words. This deficiency hinders the development of vocabulary and comprehension skills.

Chapter 3
THE SOLUTION STRATEGY

Literature Review

Research shows a disparity in reading instruction and the ability levels of students. The number of children who are poor readers is debated, but one widely accepted indicator is that 40 percent of all U.S. nine-year olds score below the "basic" level on the National Assessment of Educational Progress (NAEP). There will always be a variety of causes for the diversity of these ability levels, but research indicates there is a wide variety of solutions to meet the needs of these students. Regardless of the definition, the number of poor readers in our society is too high. Reading failure is overwhelmingly the most significant reason that children are retained, assigned to special education, or given long-term remedial services. ("Every Child Reading," 1998 p. 52).

Significant and mounting evidence shows that technology improves students' mastery of basic skills, test scores, writing, and engagement in school (Dwyer, 1996). Realistically, few teachers have capitalized on the value of the computer as an instructional tool. This is partially due to lack of hardware resources and adequate training. With the school system becoming more technically literate, extensive professional development in this area is being addressed. According to Andrew S. Latham (1997) "This brings us to the importance of training teachers to reap the full benefits of existing technology. No matter how sophisticated the equipment, it is virtually useless without thoughtful implementation by knowledgeable practitioners." (p.88)

It's equally important that the teachers use computers to improve the integration of the reading and writing curriculum rather that rely on robotic drill and practice. The

person(s) responsible for choosing software applications must do so with curriculum integration being the prerequisite. "Choosing the wrong types of applications can undermine the very strategies that schools hope to develop" (What We Know... 1997, p.70). First, the software application must be user-friendly and workable. Any complicated program or a program that constantly breaks down will remain unused. In addition, some programs encourage the student to be a passive learner and only a receiver of information. Therefore, the student has difficulty transferring what was learned.

On the positive side, advancing technology has improved and challenged the way a child can learn with innovating and interactive instruction. "Good technology programs engage students and put them in charge of the strategies they use to comprehend meaning. In selecting technology programs, one of the questions to ask is, "Will the student have control over the reading activities to maximize learning, rather than the activities predetermine the learning?" ("What We Know About Reading Teaching and Learning,"1997, p. 70). According to Simic (1993), several guidelines should be considered when integrating technology with reading instruction:

1. Computer instruction in reading should focus on meaning and stress reading comprehension.

2. Computer instruction in reading should foster active involvement and stimulate thinking.

3. Computer instruction in reading should support and extend students' knowledge of text structures.

4. Computer instruction in reading should make use of content from a wide range of subject areas.

5. Computer instruction in reading should link reading and writing. (pp. 1-3)

To effectively integrate technology into reading, multiple intelligences, graphic organizers, and cooperative learning, higher-order thinking skills can be developed with the infusion of computer applications. In addition, the school district embraces the RAP philosophy, which stands for Research, Author, and Publish. By giving students an arsenal of technological strategies to become proficient readers, motivation for reading may increase and reading skills may improve. "Research studies (Reinking, 1988) indicate clearly that computer instruction is effective for a wide variety of reading skills and concept areas. The level of popularity of computer-based instruction in reading may vary, but few will dispute the fact that computers have won a permanent place in most classrooms" (Simic, 1993 p. 1). Additionally, teachers are receiving professional development as the strategies are taught and modeled for their classes.

Each student comes to school with a variety of intelligences which maximizes his/her learning potential. By teaching to the eight multiple intelligences as defined by Gardner, teachers ensure that all students will have strategies that capitalize on their intelligences. "Gardner's theory of multiple intelligences maintains that people possess several different capacities for creating products and solving problems. The data from his research yield evidence for at least eight discrete domains of human achievement" (Burke, 1994, p. 73). (See APPENDIX). Multiple intelligences play a key role when students are choosing reading strategies that compliment their learning style. "...[The

computer] has the vast potential as a means to accommodate the preferred learning style of individual students" (Geisert and Dunn, 1990, p. 3).

Graphic organizers can assist in conceptualizing ideas. The visual learner is given tools to visually organize his understanding of reading concepts. As quoted by Costa, Bellanca, and Fogarty, (1992) "The ability to generate and organize information is fundamental effective thinking and learning" (p.81). Webbing is a type of a graphic organizer, which allows students to categorize information. A mind map is another graphic organizer that develops the understanding of main idea. Software applications such as *Inspiration* and *PowerPoint* create these graphic organizers using the computer. Graphic organizers facilitate teaching thinking skills.

Johnson and Johnson's Cooperative Learning model is a strategy that enhances learning. Students use this strategy to build on another's strengths, which is positive interdependence. Deutsch as cited by Costa, Bellanca, & Fogarty, (1992) states, "Cooperation is working together to accomplish shared goals. In cooperative situations, the goal attainments of participants are positively correlated; individuals perceive that they can reach their goals if and only if the other group members also do so." (p.170) Technology adapts well for cooperative learning. Reading can be done in pair/share groups at the computers and jigsawing with technology can be utilized to research assigned topics.

Thinking skills are an important strategy when teaching reading comprehension. The reader must be able to discern the author's meaning and, in non-fiction reading, transfer the information for his or her use into the final product. As stated in, *If Minds*

Matter I by Costa, Bellanca and Fogarty (1992), "a strategy for teaching elementary students how to summarize a story (synthesis) includes the following steps:

1. Delete trivial material
2. Delete repetitious material
3. Substitute a general term for a list of specific terms
4. Combine a list of actions into a broader single action
5. Select a topic sentence
6. Create a topic sentence" (p.27)

Thinking skills taught across the curriculum provides the students with confidence needed to obtain in-depth understanding of his world.

> According to Oliva as quoted by Hamilton (1995), "Currently we are in the stage of simulations and hypermedia. Simulations are the recreations of naturally occurring phenomena. Students are allowed to change different variables and see what happens. This is discovery learning in which children get the opportunity to experiment with quasi-real life situations. Unlike previous programs where the responses are predetermined, students can apply the higher thinking skills as indicated in Bloom's Taxonomy." (p.3)

They are permitted to analyze, synthesize, and evaluate what they see. Hypermedia carries this process a step further; students can gather information from a variety of sources via cable, CD-ROM, stereo and international databases and integrate them into a total, polished presentation" (Hamilton, 1995 p. 3).

A strategy that Gardner emphasizes as a major component of learning is project-oriented tasks. "According to Gardner, "...a human intellectual competence must entail

a set of skills for problem solving—enabling the individual to *resolve genuine problems or difficulties* that he or she encounters and, when appropriate, to create an effective product—and must also entail the potential for *finding or creating problems*—thereby laying the groundwork for the acquisition of new knowledge... the ideal that is valued will differ markedly." (Chapman, 1993 p. 1). The RAP model capitalizes on this facet of learning. Research requires the student to read while investigating a particular topic using both the Internet and electronic reference software. Word processing and presentation software expedites and enhances the student to author their findings. Presentation of this finished product allows the student to share the new knowledge. Technology creates new ways to present information in a motivating format for the audience. Thus, confidence is raised in the presenter.

Attributes that contribute to making good readers are motivation for reading, clear understandings of what is read, and a well-developed vocabulary. One of the best practices that the Right to Read Initiative of the Illinois State Board of Education has identified is the meaningful incorporation of technology strategies. "The development of each individual as an active lifelong learner is essential for our survival as a nation. Technology is a tool that serves the needs of education in a way that no other tool can"(Geisert & Dunn, 1990, p. 11). Technology motivates students in a way no other teaching tool does by providing hands-on engagement. Another benefit of technology is that it can paint a picture for clear understanding with diagrams, charts, and graphic organizers. By using computers for vocabulary lessons, students increase their verbiage. "Computers have the flexibility and capacity for individualizing instruction by permitting ongoing active involvement of students, evaluating their responses and

adapting instructional strategies that meet individual needs, levels of achievement, and specific interests" (Geisert and Dunn, 1990, p. 3). Based on the review of the literature, these action researchers will combine the use of technology into various reading strategies throughout the content areas of the curriculum with the focus being on comprehension and vocabulary development.

Project Objectives

As a result of the infusion of technology to support reading instruction, during the period of September 1, 1998 to February 1, 1999, the fourth grade students from the targeted class and the seventh grade students from the targeted class will increase their reading comprehension and vocabulary skills, as measured by district reference tests, observation checklists, classroom test scores, and student artifacts.

In order to accomplish the project objective, the following processes are necessary:

1. Incorporate a series of reading strategies with a focus on comprehension and vocabulary
2. Integrate a variety of appropriate software which meets the needs of these teaching strategies
3. Integrate the reading strategies into other subject areas

Project Action Plan

I. Incorporate a series of reading strategies with a focus on comprehension and vocabulary

   A. Teach and apply a variety of graphic organizer

      1. Use the software Inspiration to teach the elements of a story
      2. Use a mind map describe the characters of a story

3. Use sequence chart to order the events of a story
4. Use the prediction tree to predict the ending of a story
5. Use the web to teach vocabulary

B. Implement strategies from the various cooperative learning models
   1. Use the Structural Approach when reading the chapters of a book
   2. Incorporate the Curriculum Approach by acting out a prediction of a story
   3. Use Group Investigation to identify the problem in a story and brainstorm solution.

C. Incorporate thinking skills activities
   1. Use paired verbal fluency to identify traits of a character
   2. Use Predicting Outcomes
   3. Use Evaluating to think of solutions to a character's problem
   4. Use the Human Graph model to take a stand on an issue in a story

D. Incorporate a variety of strategies that teach to Multiple Intelligences
   1. Use music when introducing a novel
   2. Make a timeline
   3. Read the title of a story and ask its meaning
   4. Exercise Group Energizers give positive reinforcement

E. Students keep on-going journals
   1. Use Reflective Lesson log after reading a story/ chapter
   2. Use the problem solving log
   3. Use double entry log

III. Integrate a variety of appropriate software which meets the needs of the specified teaching strategies

A. Teach Inspiration as part of the technology curriculum

1. Students will go once a week to practice vocabulary using Inspiration
2. Students will produce a graphic organizer to show comprehension of the vocabulary

B. Incorporate strategies to use with electronic reference materials

1. Use cut and paste techniques with Encarta to research areas of interest
2. Implement a data base strategy

C. Utilize bookmarked sites on the Internet to read and gather information

1. Teach navigational strategies
2. In pairs take notes on pertinent information

D. Embrace the RAP philosophy using Microsoft Office applications

1. Use Microsoft Power point to create book reports
2. Use Microsoft Word to create a document

E. Apply with multimedia software from networked or outreach sources such as Mid-Illini Educational Consortium

1. Tom Snyder- Decisions, Decisions
2. Carmen SanDiego

IV. Integrate the reading strategies into other subject area

A. Use the RAP model to teach content in the social studies area

B. Use Inspiration to classify in the science content area

C. Use Microsoft Word to teach the writing process

D. Use multimedia math program that emphasize story problems

Methods of Assessment

In order to assess the reading intervention, these action researchers will select items from the district criterion test in order to pre and post test students in the intervention classes. Selected items will focus on comprehension and vocabulary. As a part of the process a case study will provide additional information. Both student and teacher interviews, developed by the action researchers, will be given to assess the reading intervention.

CHAPTER 4

PROJECT RESULTS

Historical Description of the Intervention

The research project was designed to improve reading in the area of vocabulary and comprehension through the use of technology and other reading strategies. In order to accomplish this purpose, we integrated a variety of strategies both online and through utilizing various software applications. Due to the complexity of combining the training in the software use and application to the content areas, the intervention is ongoing.

Beginning in the Fall of 1998, designated students at both Site A and B were given a variety of assessment instruments. This was done in the form of both student and teacher interviews (Appendix A) along with standardized tests. In addition, four students were chosen at random as case studies and documentation was recorded with weekly observations using teacher made checklists (Appendix B).

At the beginning of the intervention the students were exposed to a series of reading strategies focusing on vocabulary and comprehension. Then, specified teaching techniques were employed to integrate a variety of appropriate software applications with the vocabulary and comprehension strategies.

The intervention was begun the third week of September. The instructional strategy of cooperative learning was introduced to all classes and integrated into the curriculum. As an important part of the intervention, students were instructed in the use of various graphic organizers to teach them how to visualize their thinking. The software Inspiration (Appendix D) was incorporated into the teaching of science vocabulary, chapter outlining in social studies and science, character development, categorizing regions and jigsawing a chapter (Appendix E). Other graphic organizers such as mind maps, Venn diagrams, the web, prediction tree, K-W-L charts and sequence charts (Appendix F) were included in the intervention. Mind maps were used in the writing process to identify the topic and state specific details for each subtopic. Venn diagrams were tools that helped the students' visualize comparisons of two or more concepts. Vocabulary was enriched with the strategy of webbing. Students were able to make informed assumptions by incorporating a prediction tree prior to reading a story. In order for students to organize the details of a story, events were recorded in a form of a sequence chart. K-W-L charts helped introduce a story or specific topic of a content area by capturing students' attention, drawing upon prior knowledge, and reflecting on the information they have learned.

Site A employed the Structural Approach when reading specific chapter of a novel; the Curriculum Approach when acting out the different scenes in a story; the Group Investigation Approach when identifying the problem and its solution inn a story (Appendix C). While incorporating thinking skills (Appendix G) into reading, paired verbal fluency was used to identify the traits of a character.

Students solved the characters' problems in stories read by using an evaluation strategy. The students practiced the skill of predicting outcomes by recording their thoughts when reading various stories.

Many strategies were implemented at both Sites A and B to teach to the multiple intelligences of the students (Appendix H). Parts of speech were taught by introducing a medley of music and PowerPoint presentations were enhanced using music from the civil war era. Timelines were created to demonstrate the history of a character's life. Several Group Energizers (Appendix I) were taught to motivate and reinforce interaction in cooperative groups. Students reflected in many different types of journals. Double entry journals (Appendix J) were used to record student's thoughts both before and after activities. The software, Tom Snyder Decisions, Decisions series (Appendix D), required student to keep problem solving logs (Appendix K). Daily thoughts were recorded when reflecting on various activities throughout the intervention.

Many software applications were integrated at both sites into the core curriculum to meet the specified teaching strategies (Appendix D). Inspiration was used to outline content from many subject areas as a study guide. Along with using Inspiration for organizing details in content areas, Microsoft Office products were also an integral part of the intervention. Students used Microsoft Word to improve upon their writing processes. As another application of Microsoft Word, students in social studies class typed papers on the medieval times. Social studies classes also worked on creating PowerPoint presentations from the subtopics in their history text. Our classes presented slide

presentations using Microsoft PowerPoint while studying biomes. After researching nutrition topics on the Internet, slide presentations were created to add more information to the current data. The students used PowerPoint for vocabulary development in reading by creating a separate slide for each new vocabulary word in order to teach the rest of the class the meanings of these new words. Microsoft Excel was used to analyze and categorize weather data from cities around the United States.

Both sites provided additional software on CD-ROM to all students for increasing reading skills. This software enhances reading for meaning, finding details, and comprehension. The information CD's that were used by the researchers were Clearvue, Encarta, Groliers, and Facts on Illinois. Other CD's for comprehension were Reading Blaster, Critical Concepts and Vocabulary Builders. Tom Snyder's Decisions, Decisions-The Environment CD was used in cooperative groups to emphasize reading for details, finding inferences and drawing conclusions (Appendix D). The students were required to brainstorm solutions in their cooperative groups. Each student had his own role to share with his individual cooperative group to help the group make an informed decision.

A powerful tool of the technology intervention at sites A and B was researching on the Internet. To make this effective, several teacher-created scavenger hunts (Appendix K) were designed for the purpose of teaching navigational skills when researching topics. This strategy also reinforced students' reading-for-information skills. When studying the United States,

students used a specific site to gather facts about individual states, sort this information, and incorporate it into slide presentations. The Scholastic Network (Appendix L) site was used to find details by reading information that is categorized by content area. Specific governmental sites on the Internet were researched to increase student knowledge about cities from which they were collecting weather data.

Throughout the action research, the researchers at Sites A and B integrated reading strategies into other content areas. The district philosophy calls for a *Research Author Publish* model (Appendix M), which was incorporated throughout the curriculum. Site A transferred these reading strategies in the content areas of science, social studies, and language arts. Site B included the content areas of science and social studies for their transfer of reading strategies.

Presentation and Analysis of Results

Post-standardized tests were given to students at both sites A and B. A critical component of this intervention was the analysis of the data. Site A results showed an 11% increase in overall skills on the standardized test given. The results were more compelling at Site B as their increase was 40%.

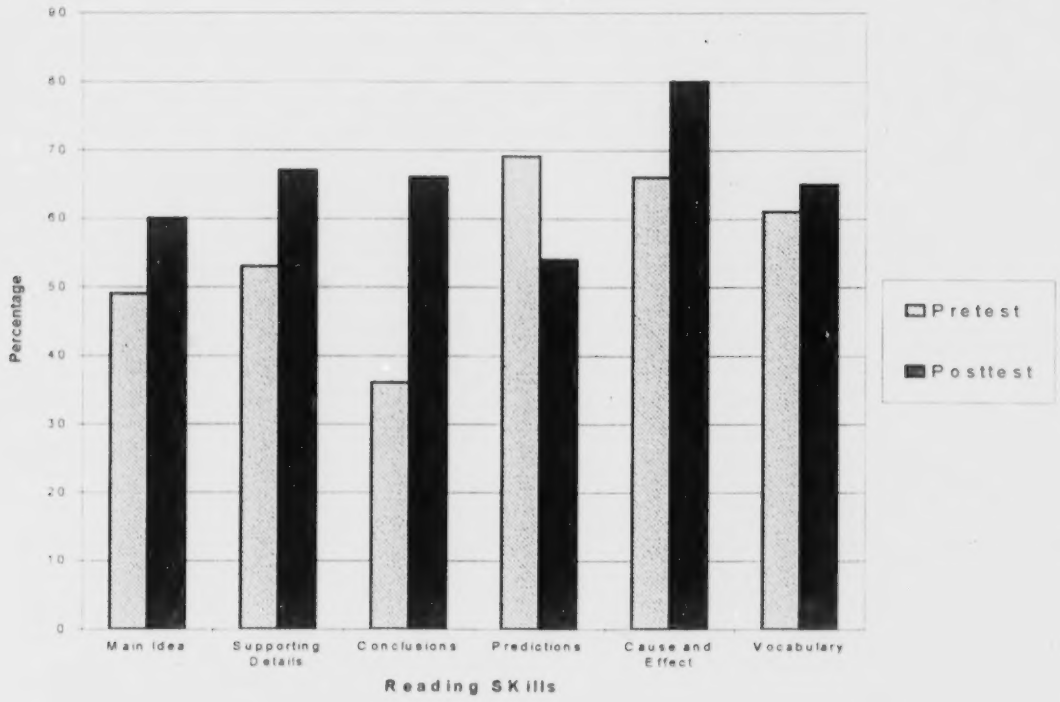

Figure 8 Site A A comparison of percentage of correct responses of the targeted 4th grade classes

Figure 8 shows the specific reading skills that were posttested in the targeted fourth grade and compares them to pretest scores. While there was a gain in *drawing conclusions*, the percentage of correct responses for *prediction* did not show an overall gain. All other tested reading areas showed steady increases in correct responses.

Post standardized tests were given to students at both Sites A and B. The students at Site A showed a gain of 30 percentage points with the *drawing conclusions* section of the posttest. Their gains were consistent in the areas of *main idea, details* and *cause and effect* ranging from 10 to 15 percentage point increases. The data from Site A showed growth in all the reading areas tested with the exception of *predicting outcomes* of a story. The inconsistencies of the

pre and post-test results with *predictions* caused the researchers to re-evaluate the test given. It was noted that there were not enough questions in some areas to adequately test all skills measured.

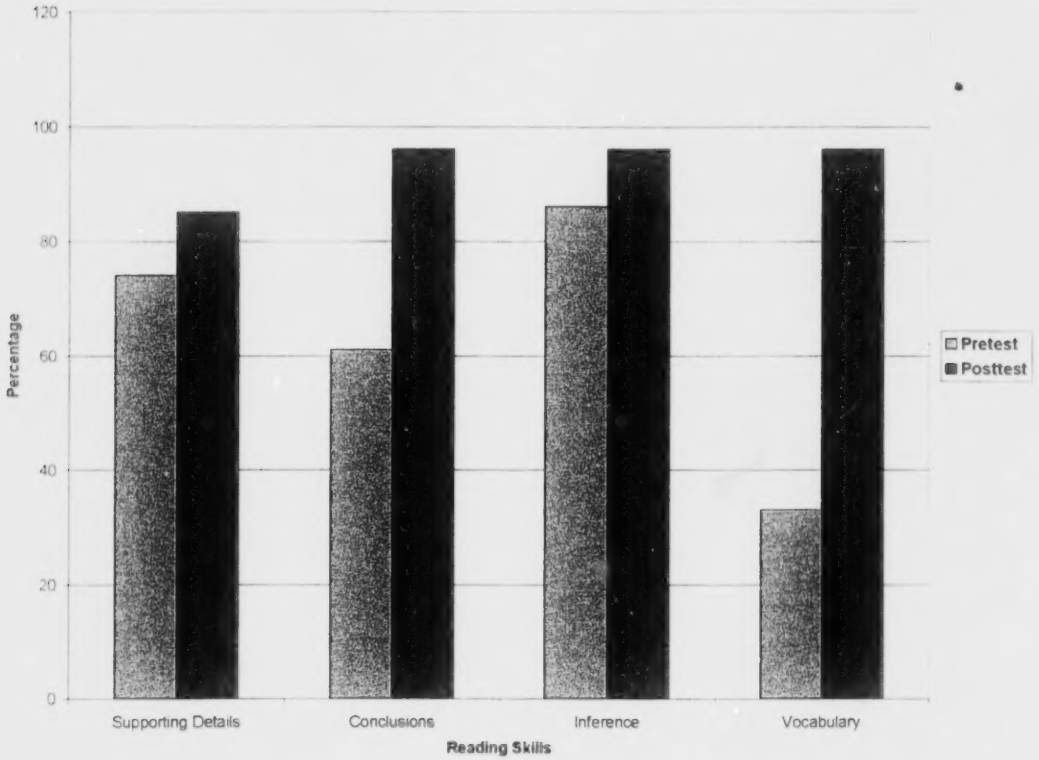

Figure 9. Site B A comparison of percentage of correct responses for reading skills of the targeted seventh grade classes.

Figure 9 indicates that the majority of students in the targeted seventh grade class mastered the questions in all four areas. The largest gain of the group was in *vocabulary*. A definite gain was also evident in *drawing conclusions*.

Site B students made high gains in all four skill areas tested. Their most dramatic growth was in the areas of *drawing conclusions* and *vocabulary*. While

student's scores improved a total of 35 percentage points in the area of *drawing conclusions*, their gain was even greater in *vocabulary* with a 63 percentage point increase in correct responses. The other two areas tested, *supporting details* and *inferences*, showed a growth of 11and 10 percentage points respectively. It was noted that the teacher at Site B placed more focus on *vocabulary* when utilizing technology and reading strategies.

Part of the data collecting process involved the interviews of teachers from the targeted grade levels. Interview information was given to nine fourth grade teachers and twelve seventh grade teachers. A total of twelve interviews were returned. Questions and responses were as follows:

1. What type of improvements have you seen in your students' reading strategies since the beginning of the school year?

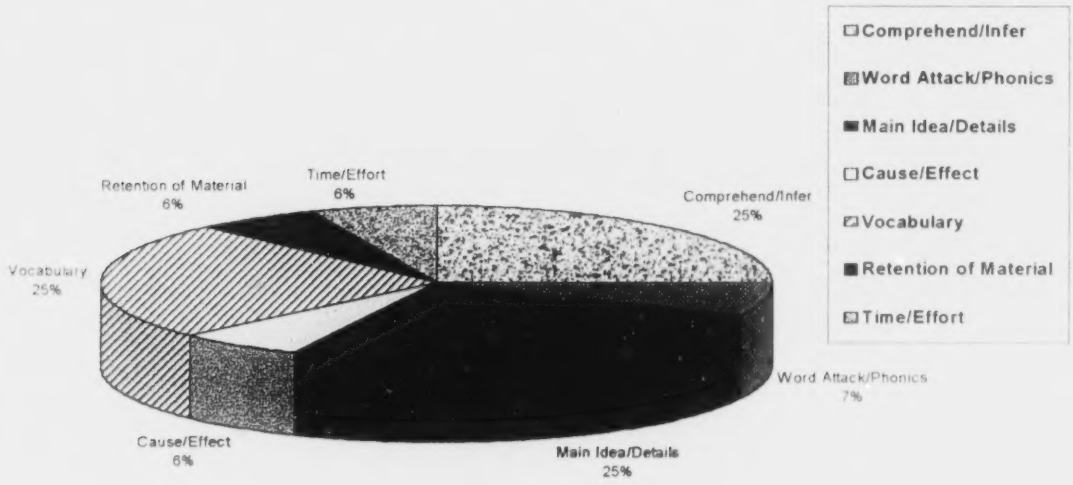

Figure 10. Site A and Site B Teacher responses to improved reading skills

Figure 10 shows the areas of improvement in reading skills indicated by teachers during their post interview.

2. What type of assessment are you using in your classroom at this time on a regular basis?

A higher number of teachers reported in the post interview that they used a wider variety of assessment tools such as portfolios, rubrics and group projects. The increased use of alternative types of assessment may be attributed to sharing of materials, collaboration of ideas and professional development. In

addition, teachers challenged students by including higher order thinking skills into their assessment.

3. In what ways do you feel learning different reading strategies are helping your students transfer reading skills into other subject areas?

Teachers felt that the different reading strategies facilitated the transfer into other content areas. One teacher stated that many students need alternative strategies to read and comprehend textbooks, notes, handouts, and all other reading material in any subject area. Another advantage of using these strategies was helping students become independent in these content areas. The general consensus showed that using multiple reading strategies across the curriculum was most beneficial to all students.

The results from the post-teacher interview revealed that the reading skills that teachers noticed students were lacking were the same skills in which the student had shown the most growth since the beginning of the research. Teachers noticed significant gains in the areas of *vocabulary, comprehension*, and *main idea and details*. These interviews unveiled that teachers were challenging their students by placing a greater emphasis on higher level thinking skills and making use of a wider variety of assessment tools than prior to the intervention. It was also documented that teachers felt that their students needed to reinforce *vocabulary and comprehension skills* in order to transfer them to other content areas. These multiple strategies proved helpful in teaching students to become more self-sufficient in other areas across the curriculum.

Table 3

Site A Percent of Student Responses to Self-Assessment Survey

	Always		Sometimes		Not very often		Never	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST
1. When reading difficult paragraphs, I study the graphs and tables.	.20	.22	.40	.45	.26	.15	.14	.18
2. When I want to find a topic in a book I look in the Table of Contents or Index.	.51	.53	.32	.35	.13	.13	.005	0
3. When reading I underline or highlight important words.	.14	.004	.23	.33	.28	.38	.35	.25
4. When reading I carefully look at the first sentence in each paragraph.	.23	.27	.40	.31	.20	.25	.17	.16
5. When reading I stop and think about what I just read.	.18	.29	.52	.45	.22	.24	.80	.002
6. When reading, I read every word rather then skipping parts of the paragraph.	.57	.69	.27	.22	.14	.007	.002	.002
7. When reading I say the words quietly to myself.	.47	.40	.32	.49	.16	.009	.006	.002
8. After reading something difficult, I put it in my own words.	.23	.18	.36	.29	.14	.35	.27	.18
9. When reading I look at the headings and bold print in books.	.35	.49	.43	.40	.10	.005	.11	.005
10. I look at the Table of Contents and Chapter headings of books I read.	.40	.35	.27	.35	.25	.16	.008	.15

Table 3 reports a slight improvement in the use of reading strategies by the targeted fourth graders. This survey shows the percentage of students who report using each strategy.

Table 4

Site B Percentage of Student Responses to Self-Assessment Survey

	Always		Sometimes		Not very often		Never	
	PRE	POST	PRE	POST	PRE	POST	PRE	POST
1. When reading difficult paragraphs, I study the graphs and tables.	.14	.29	.50	.46	.18	.18	.18	.007
2. When I want to find a topic in a book I look in the Table of Contents or Index.	.46	.32	.39	.57	.004	.11	.11	0
3. When reading I underline or highlight important words.	.004	.007	.32	.32	.39	.46	.25	.14
4. When reading I carefully look at the first sentence in each paragraph.	.14	.14	.57	.36	.14	.36	.14	.14
5. When reading I stop and think about what I just read.	.007	.25	.68	.46	.18	.18	.007	.11
6. When reading, I read every word rather then skipping parts of the paragraph.	.50	.61	.39	.18	.11	.14	0	.007
7. When reading I say the words quietly to myself.	.32	.36	.29	.36	.32	.11	.007	.18
8. After reading something difficult, I put it in my own words.	.18	.004	.50	.29	.11	.29	.21	.39
9. When reading I look at the headings and bold print in books.	.43	.46	.46	.32	.004	.11	.007	.11
10. I look at the Table of Contents and Chapter headings of books I read.	.39	.32	.29	.36	.25	.18	.007	.14

The data in Table 4 report an inconsistent use of reading strategies by the targeted seventh graders. This survey shows the percentage of students who report using each strategy.

After reviewing the student self-assessment surveys, it was evident that students at Site A were unsure of the meaning of the questions. It was apparent

that the students were trying to answer the questions according to how they thought the teacher wanted them to respond, but in all actuality these skills had not been taught to them. After the intervention, a higher percentage of students used the *heading and bold print* when reading their text. In their post surveys, a slight increase of students stated that they read the first sentence of the paragraph more carefully.

The students at Site B were more mature in age, therefore had been previously exposed to these reading strategies. When answering the student self-assessment survey, it appeared that student's answers were more honest during the post survey. After the intervention, a larger percentage of students reported that when reading difficult paragraphs they studied the graphs and tables. However, students reported in their post surveys that they did not put text that they read into their own words more frequently than prior to the intervention.

Students at both sites A and B reported a substantial increase in using the strategy of reading every word rather than skipping parts of a paragraph. Another gain at both sites, as reported by students, was that they took time to stop and think about what they just read.

Each of the four researchers chose one student for a case study. All case study students were chosen at random. At Site A, case study number one was a male of average reading ability. He appeared to be a good listener. The observer also noted that he liked to draw and demonstrated quite an artistic flair. This student has proven, by the district criterion tests, that he has the ability to do well academically, but is not consistent in his efforts. The researcher observed

him having difficulty completing tasks and often wanting the attention of the teacher's assistant in the classroom. During the intervention, the student's reflections and researcher's on-going observations showed that this student was increasingly becoming engaged in his own learning. He mastered the technological skills quickly and was able to combine the technology and reading strategies with a more enthusiastic approach. In addition, this student was finishing his work with little assistance from the adults in the classroom. The observer noted that the technology was a very motivating tool for him as it allowed him to maximize his visual/spatial talents to show his true ability, and at the same time, add his own creative touch.

Case study number two at Site A was a male and a below average learner. Determined by local criterion assessment, this student's reading ability is below his current grade level. It was observed by the researcher that he was a very helpful student to any teacher and had the desire to do the academic work but lacked the ability. Researcher observations concluded that this student had a difficult time understanding most tasks that involved multiple steps. When using graphic organizers and technology strategies, the student stated that he sometimes became confused. However, one could observe that he was still motivated. The student progressively became more actively engaged in his learning as cooperative groups were utilized, as observed by the researcher.

Student three at Site A was a female of above average ability. Reading comprehension and word analyses are her strong areas as documented by the local criterion assessment. She was an avid reader who was observed to employ

many reading skills in her learning. She is highly motivated to do her best and is proud of her successes. She tended to be an unreliable participant in cooperative learning groups involving paper and pencil tasks. When using technology in cooperative groups, it was observed that she became more actively involved.

The case study student at Site B was a female of above average ability. In the student interview, it was stated that reading is very important to both her and her family. Through observations it was concluded that this case study student was always on task, but not very comfortable in classroom discussions. As the intervention progressed, observations by the researcher noted that she became a more active participant. The student reported in her post interview that her confidence in her ability grew as she applied the graphic organizer strategy to various aspects of the curriculum. In her posttest and local criterion test, she made large gains in all areas of the intervention.

Conclusions and Recommendations

These action researchers collaborated and created an extensive plan to infuse technology into students' reading skills. An important first step was to pretest all students at both Site A and Site B using the school district's criterion test. This, along with other assessment methods, allowed the action researchers to assess the students' strengths and weaknesses in vocabulary and comprehension and plan the implementation of different strategies accordingly.

After analyzing these results, the next step was to teach a variety of reading strategies that could be used across the curriculum. These students

then applied these same strategies to technology using appropriate software. Cooperative learning, critical thinking, and accommodating students' multiple intelligences were used simultaneously throughout the intervention.

Although the post-testing of the intervention did in fact show some increase in reading skills with Site A and a significant gain in skills with Site B, these action researchers feel there are some extraneous variables which influenced the intervention and the final results. First, it should be noted that Site A has a transient population. The number of students tested at the beginning of the year was different from the numbers tested in January. In addition, two of the three classes at Site A are inclusionary classrooms. Therefore, many of these students have active Individual Evaluation Programs that show a deficiency in reading ability. Gains for these students might occur at a slower rate because special needs students need more time to attain their goals. Another important consideration is that the students from Site A, which is a four through six grade building, came from six different Kindergarten through third grade schools in the district. Therefore, their technology background was varied.

Another variable that might reflect test scores was the additional time needed to get the hardware functional and acquire the necessary software for the school year. Both sites made sure that software licenses were secure before loading these applications on numerous machines. These teachers then had to familiarize themselves with the software and plan for the integration into the content areas.

As much as there were variables that sometimes caused frustration, these action researchers also discovered many additional benefits as a result of this project. First and foremost, it was quickly noted that technology fosters student motivation. Once these students learned the mechanics of a particular software application, they were immediately focused on creating a product by incorporating one of the various reading strategies that was learned. Using programs such as Microsoft PowerPoint encouraged individuality along with independence. Students at both Sites A and B can comfortably complete a *RAP* (Research, Author, Publish) product using both graphic organizers and technology. In addition, they are secure in mentoring one another with their own expertise. This allows the classroom teacher time to facilitate and guide students in the areas needed. Another interesting observation these action researchers found was although many of the students struggle with reading vocabulary and comprehension they were very proficient when using a variety of software applications. They learn quickly and are not afraid to make mistakes. Therefore, their thought process was focused on the reading strategy and not on the technology skills because technology is a natural process for them.

The researchers at both sites are confident that their goals were attained. These researchers found it was difficult to determine how much of the technology contributed to the success of the targeted classes. However, the combination of both newly learned reading strategies and the use of a variety of technological tools enhanced student learning by providing skills to transfer these strategies

and technological tools to all areas of the curriculum. Most importantly, it gave the students the confidence to be responsible for their own learning.

This research has been very beneficial for the researchers; however, there are many modifications that would be recommended to make this intervention more successful. The first change would be the number of months that the intervention was employed. Pre-testing would be completed the middle of September, and post-testing would not be given until the middle of May. Another variance from the Action Plan would be that just as it is important to pre-test a student's reading skills, it would also be advantageous to assess their ability to operate a computer. This would allow teachers more time to be focused on the application of the actual software program. When evaluating the pre and post-tests, the teacher-made instruments needed some validity testing done prior to administering it for the data collection of the research. At Site B, the researcher would recommend using four classes to collect data and employ the intervention. The researchers believe that it is not the software that increases reading scores, but rather how it is implemented into the subject area. These researchers had planned to use a much larger variety of software, but discovered it was much better to build on a few quality programs, which were flexible in their use, but met specific needs.

In conclusion, the action researchers at both Site A and Site B firmly believe that combining technology and varied reading strategies will improve student performance in all areas of the curriculum. It is evident that the use of technology as a tool can enhance motivation and individual learning styles. As

technology evolves, these action researchers believe their goal is to prepare all students for the 21st century. At the same time, these action researchers believe it's imperative to pursue their own professional development to meet the needs of future learners in this ever-changing world. This will inspire success for both the teacher and the student.

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Appendices

Student Interview on Reading Strategies

A= Almost always
B= Often/ Usually/ Frequently
C= Sometimes/ Occasionally
D= Not very often/ Seldom
E= Very rarely

	Yes	No	Comments
1. When reading , I tend to skip over the more difficult sections, including graphs and tables.			
2. When I want to find a topic in a book I tend to flip through it until I come across it.			
3. When reading I tend to underline or highlight interesting passages.			
4. When reading I tend to take notice of the first sentence in each paragraph.			
5. When reading I ten to stop periodically and mentally review what I have read.			
6. I tend to read every word rather than try to skim the contents.			
7. When I read I tend to say the words quietly to myself.			
8. After reading something complex I usually try to rephrase it in my own words.			
9. When reading I take notice of headings and bold print in books.			
10. I tend to take notice of the Table of Contents and Chapter headings of books.			

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Teacher Pre-Interview

This study is being conducted by Mary Lange, Camille McCarty, Linda Norman and Noelle Upchurch, students in the Field-Based Masters Program at St. Xavier's University. The purpose of the study is to look at strategies that might improve comprehension and vocabulary skills in reading. Your participation in this study is strictly voluntary; there are no penalties if you choose not to participate. If you decide to participate, the information you provide will remain completely anonymous.

Thank you for taking the time to complete the attached survey.

Mary Lange Camille McCarty
Linda Norman Noelle Upchurch

1. What reading strategy do you see students struggling with most frequently?

2. Do you feel a student needs to be a good reader in order to be successful with incorporating technology?

3. Do you think computer programs have helped your students with their reading skills?

4. What type of assessment do you do in your classroom on a regular basis? (multiple choice, essay, T/F, matching)

5. What kinds of problems do you see with the transfer of reading skills into other subject areas?

Teacher Post Interview

This study is being conducted by Mary Lange, Camille McCarty, Linda Norman and Noelle Upchurch, students in the Field-Based Masters Program at St. Xavier's University. The purpose of the study is to look at strategies that might improve comprehension and vocabulary skills in reading. Your participation in this study is strictly voluntary; there are no penalties if you choose not to participate. If you decide to participate, the information you provide will remain completely anonymous.

Thank you for taking the time to complete the attached survey.

Mary Lange Camille McCarty
Linda Norman Noelle Upchurch

1. What type of improvements have you seen in your students' reading strategies since the beginning of the school year?

2. Are your academically challenged students less successful in the use of technology than the rest of the class?

3. What type of assessment are you using in your classroom at this time on a regular basis?

4. In what ways do you feel learning different reading strategies are helping your students transfer reading skills into other subject areas?

Observation Checklist

Name_____ Date_____

This observation will be done twice a month at the same time of the day. Tally number next to statement of every observable action. Mark N/A if observation statement is not part of the classroom lesson.

Observation	Tally N/A	Comments
Student participates in class discussion.		
Student questions or asks for help.		
Student's body language indicates active listening.		
Student shows time on task.		
Student appears to be able to follow directions that were just given.		
Student volunteers to read.		
Student is involved and contributes to cooperative group task.		
During silent time student shows interest in finding and/or reading a book.		

Cooperative Learning Models

Model	Description
The Conceptual Approach	Theories of cooperation, competition and expectation-state theory
Curriculum Approach	Curriculum packages that have cooperative learning structured into the materials
Structual Approach	A repertoire of interactive strategies
The Group Investigation Model	The ultimate classroom jigsaw
The IRI Synthesis Approach	A synthesis of the four cooperative learning approaches with higher order thinking focus

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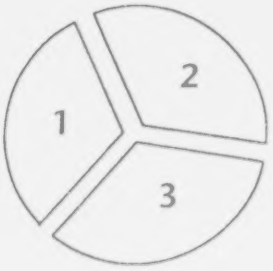
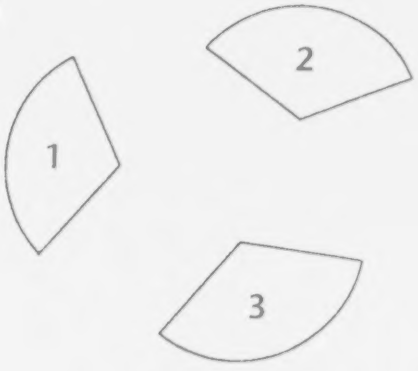
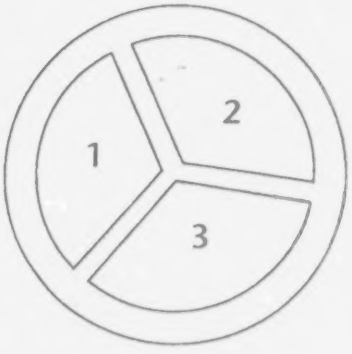
JIGSAW



Base Group
(Members divide work.)

Individual Work
(Members decide *what's* important and *how* to teach their fellow group members.)





Base Group
(Members teach each other.)

TWO DECISIONS

#1 What to teach . . .

#2 How to teach it . . .

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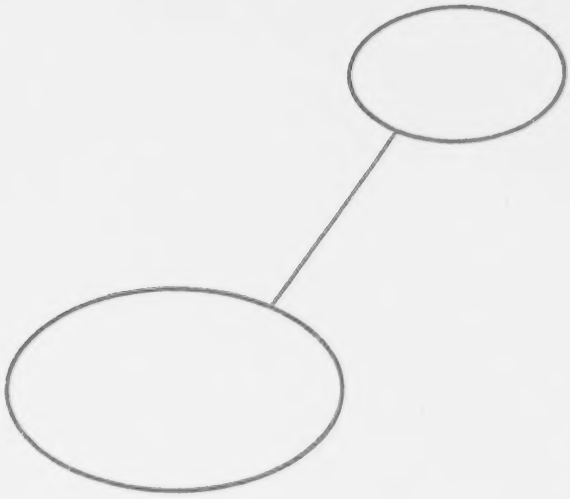
NAME _____ CLASS _____

THE MIND MAP



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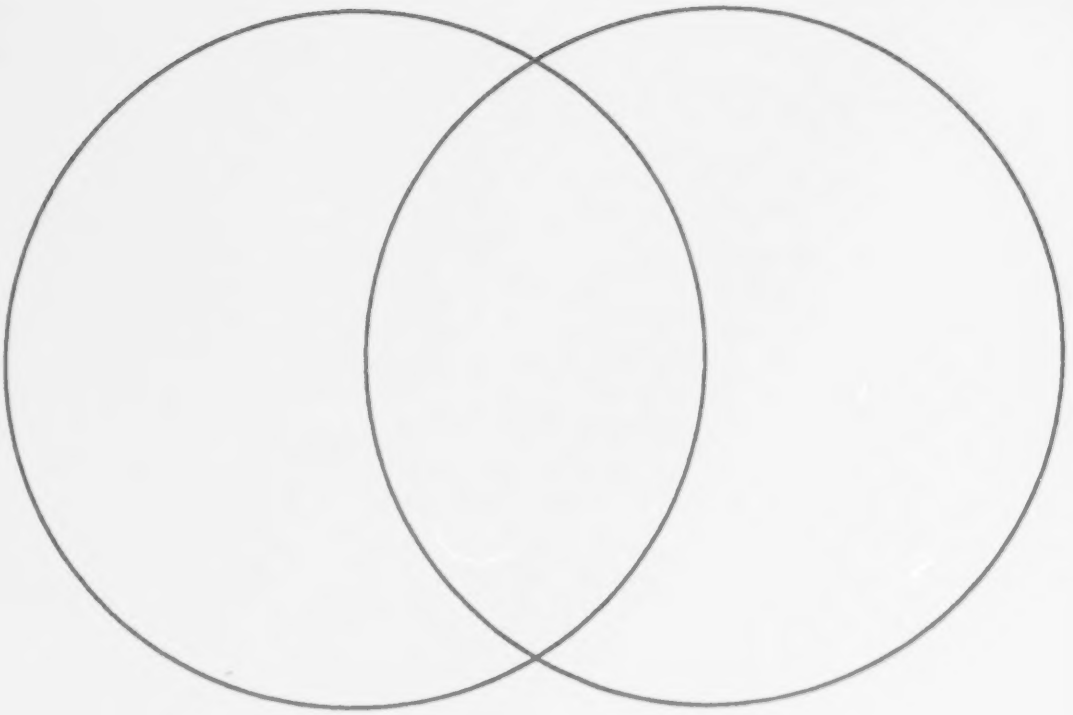
NAME _____ CLASS _____

VENN DIAGRAM



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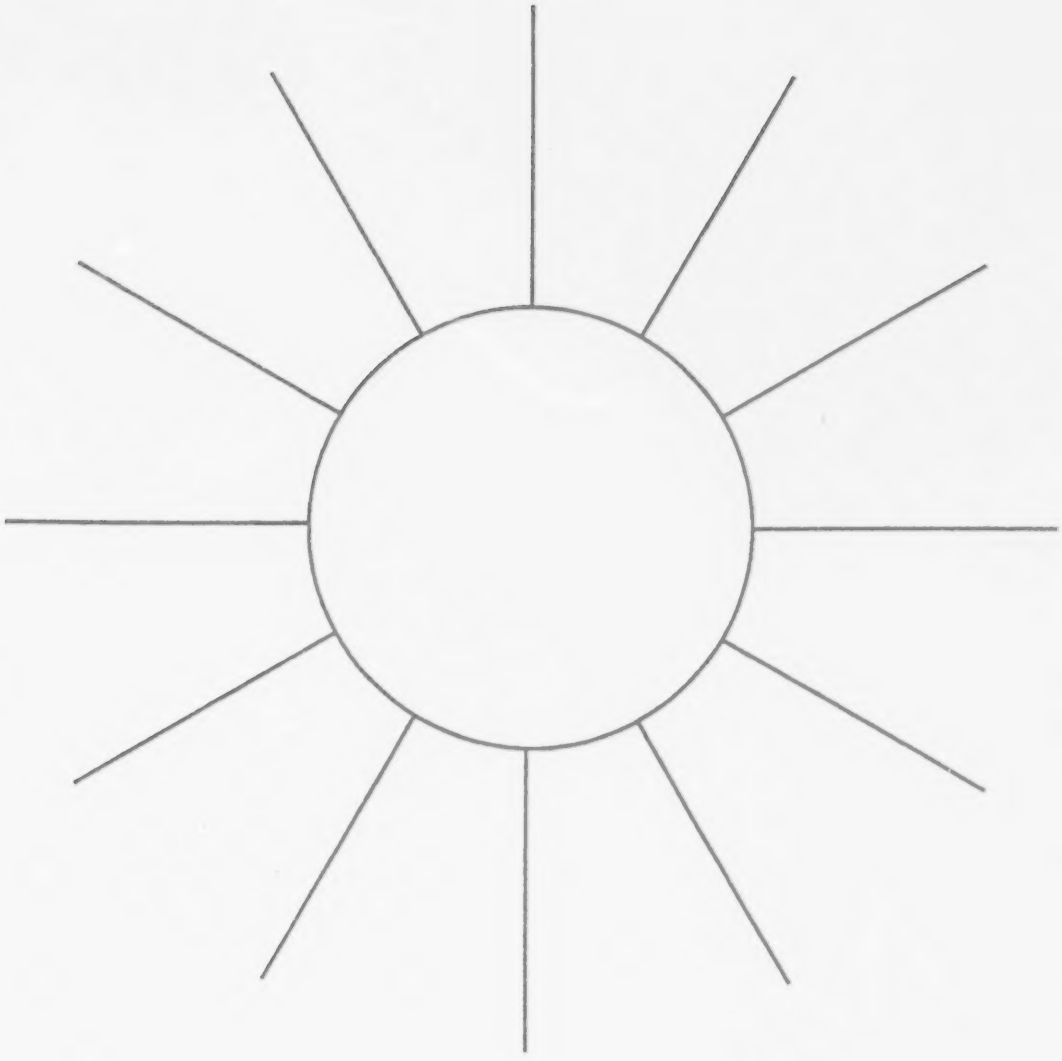
NAME _____ CLASS _____

THE WEB



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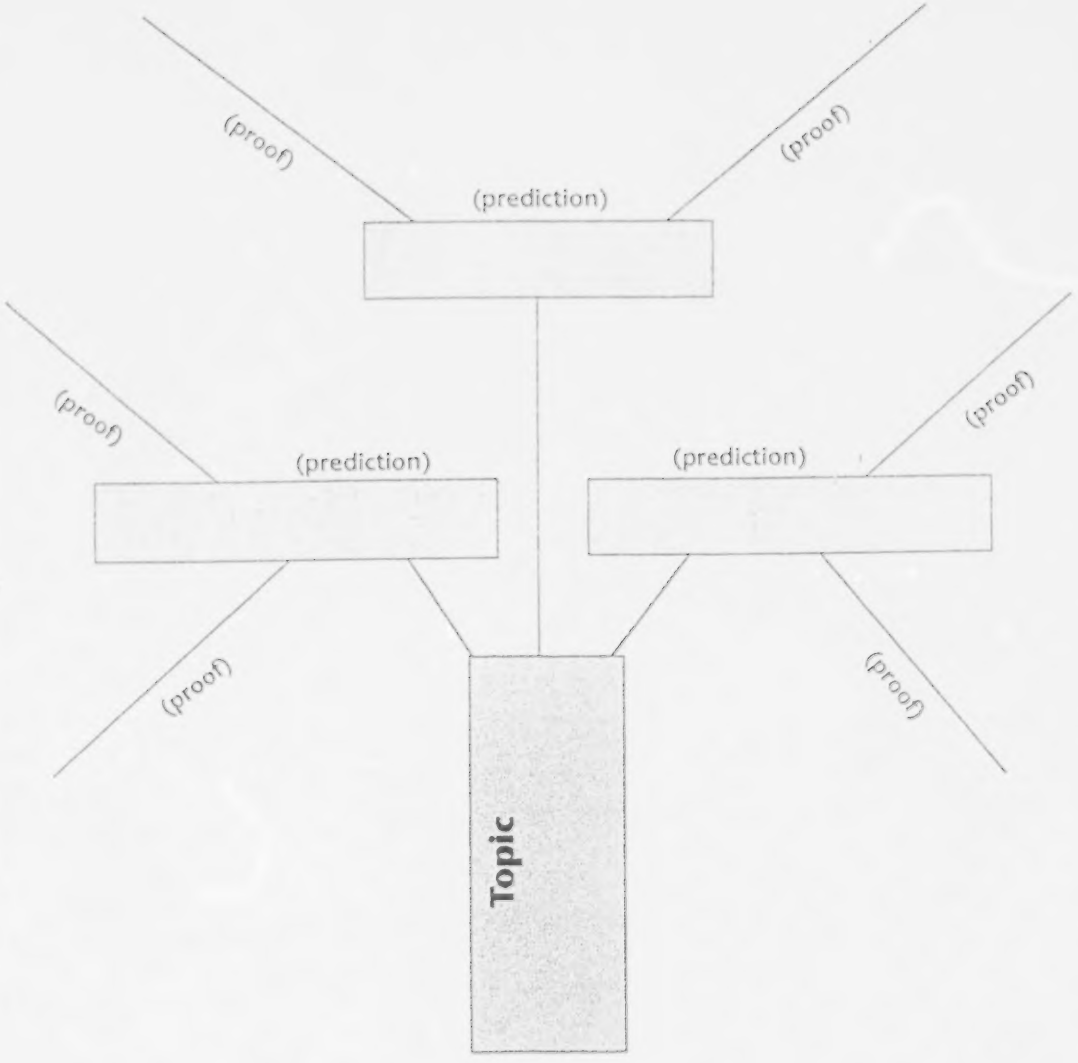
THE PREDICTION TREE



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THE KWL

Topic: _____

Know	**W**ant to know	**L**earned

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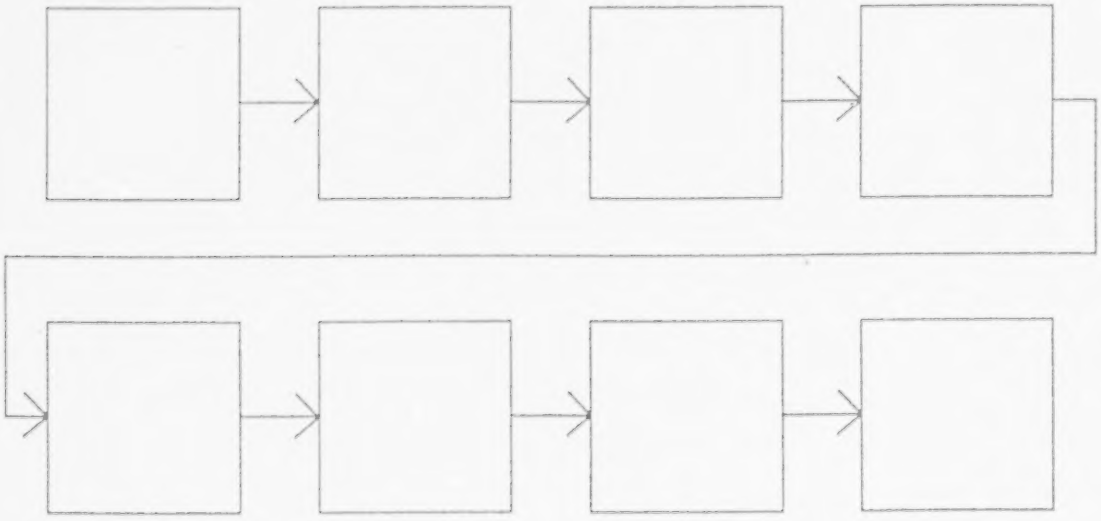
NAME _____ CLASS _____

THE SEQUENCE CHART

Problem:



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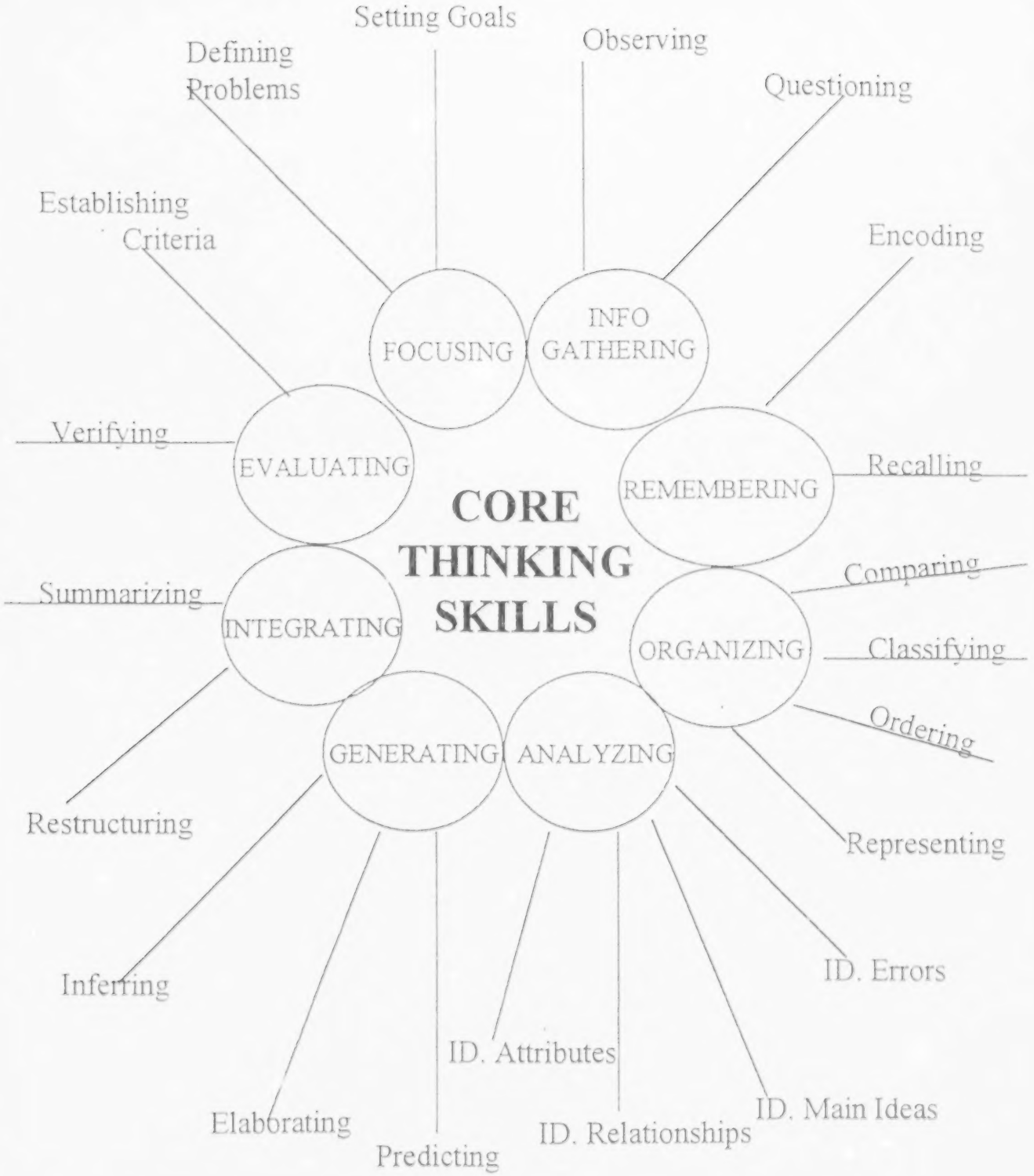

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Further Explanation of Core Skills

Focusing Skills:	Attending to selected pieces of information while ignoring others; Defining problems - determining size, shape nature of an issue. Setting goals - establishing direction and purpose, stating the desired outcome.
Information Gathering:	Observing - obtaining information through the senses; Formulating questions - clarifying through inquiry (KWL)
Remembering Skills:	Encoding - storing and linking information; Recalling - activating prior knowledge, retrieving information
Organizing Skills:	Imposing structure; Comparing - noting similarities and differences and articulating them; Classifying - grouping items based on attributes; Ordering - sequencing based on given criteria; Representing- changing the form of information to show how critical attributes are related, graphics use is essential.
Analyzing Skills:	Clarifying by examining parts or relationships; Attributing - recognizing the parts that make up the whole; Identifying relationships - seeing patterns and connections, key to principle formation, related to content expertise; Identifying main ideas - selecting essential attributes and providing evidence for that selection; Identifying errors - seeing mistakes in logic.
Generating Skills:	Add information beyond that given, create new understanding; Inferring - go beyond available information to identify what reasonably may be true; Predicting - anticipating outcomes, important to check predictions for accuracy; Elaborating - add information to prior knowledge to improve understanding.
Integrating Skills:	Putting together the relevant aspects of a solution, understanding, principle, or composition; Summarizing - combining information into cohesive statement, graphic organizers useful; Restructuring - changing existing knowledge to incorporate new information.
Evaluating Skills:	Assessing the reasonableness and quality of ideas; Establishing criteria - setting standards for judging value; Verification - confirming or proving truth, gathering evidence.

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The Eight Intelligences

There were many candidates for "intelligences" that met his definition. However, after applying numerous criteria, only seven intelligences remained. He has since added an eighth intelligence.

VERBAL/LINGUISTIC INTELLIGENCE

The verbal/linguistic intelligence is concerned with the uses of language. People with this intelligence possess a particularly strong sensitivity to the meanings of words and a skilled aptitude for their manipulation. According to Gardner, these people have "the capacity to follow rules of grammar, and, on carefully selected occasions, to violate them" (1983, p. 77). On yet another level—the sensory level—those with a heightened verbal/linguistic intelligence are able to communicate effectively by listening, speaking, reading, writing, and linking. They also have a strong awareness of the varying functions of language, or more specifically, its power to stimulate emotions. Poets, authors, reporters, speakers, attorneys, talk-show hosts, and politicians typically exhibit verbal/linguistic intelligence.

MUSICAL/RHYTHMIC INTELLIGENCE

As Gardner describes, "There are several roles that musically inclined individuals can assume, ranging from the avant-garde composer who attempts to create a new idiom, to the fledgling listener who is trying to make sense of nursery rhymes (or other 'primer level' music)" (1983, p. 104–105). Each of us holds musical capabilities to some degree, the difference is that some people have more skill than others. No matter what range of talent, we all possess a core of abilities necessary for enjoying a musical experience. These consist of the musical elements of pitch, rhythm, and timbre (the characteristic elements of a tone). People with a more highly developed musical/rhythmic intelligence are singers, composers, instrumentalists, conductors, and those who enjoy, understand, or appreciate music.

LOGICAL/MATHEMATICAL INTELLIGENCE

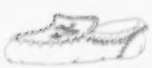
The logical/mathematical intelligence incorporates both mathematical and scientific abilities. Mathematicians are typically characterized by a love of working with abstraction and a desire for exploration. They enjoy working with problems that require a great deal of reasoning. A scientist, however, is "motivated by a desire to explain physical reality" (Gardner, 1983, p. 145). For scientists, mathematics serves as a tool "for building models and theories that can describe and eventually explain the operation of the world." Mathematicians, engineers, physicists, astronomers, computer programmers, and researchers demonstrate a high degree of logical/mathematical intelligence.

VISUAL/SPATIAL INTELLIGENCE

Visual/spatial intelligence involves the unique ability to comprehend the visual world accurately. Those with visual/spatial intelligence are able to represent spatial information graphically and have a keen gift for bringing forth and transforming mental images. Artists and designers have strong visual/spatial capabilities. They have a certain responsiveness to the visual/spatial world as well as a talent to recreate it to produce a work of art. Also among this group are sailors, engineers, surgeons, sculptors, cartographers, and architects.

BODILY/KINESTHETIC INTELLIGENCE

The bodily/kinesthetic intelligence is based on the gift of control of one's bodily motions and the talent to manipulate objects with deftness. It is possible for these elements to exist separately, however, most people possess both. In addition, people such as inventors and actors tend to have a great deal of bodily/kinesthetic intelligence because the role of their bodies is so critical to their occupations. Others with substantial bodily/kinesthetic intelligence include dancers, acrobats, and athletes.



NATURALIST INTELLIGENCE

Man's adaptation and survival in his environment is the key component to the naturalist intelligence. It is the study of science. Individuals with a strength in this intelligence can recognize and distinguish between and among a variety of species of plants and animals, as well as make other distinctions and categorizations in "nature" (Gardner 1995). Those strong in this intelligence are hikers, botanists, scientists, oceanographers, veterinarians, gardeners, and park rangers.

INTRAPERSONAL INTELLIGENCE

The heart of intrapersonal intelligence lies in the ability to understand one's own feelings. These people instinctively comprehend their own range of emotions, can label them, and can draw on them as a means of directing their own behavior. In Gardner's words, "the intrapersonal intelligence amounts to little more than the capacity to distinguish a feeling of pleasure from one of pain, and on the basis of such discrimination, to become more involved in or to withdraw from a situation" (1983, p. 239). Examples of those with higher-than-average intrapersonal capabilities include the introspective novelist, wise elder, psychologist, or therapist—all of whom possess a deeper understanding of their feelings.

INTERPERSONAL INTELLIGENCE

Unlike intrapersonal intelligence, which is directed inward, interpersonal intelligence is one that focuses outward to individuals in the environment. The most basic skill among those with a high degree of interpersonal intelligence is the talent for understanding others. Those exhibiting this intelligence have the gift for noticing and making distinctions among other individuals, and more specifically among their "moods, temperaments, motivations, and intentions" (Gardner, 1983, p. 239). For example, at a very

Group Energizers

Standing Ovation

Clam Clap

High Five

Micro-Wave
(little fingers wave)

Top Dog
(Arsenio's Cheer)

Uh Huh! Uh Huh! Yo!
Uh Huh! Uh Huh!

(Bend those knees! Get into it!)

Arctic Shiver

"shakin' all over"

Drum Roll

"air drum" on the table;
hands as drum sticks

Round of Applause

"clap in a big circle"

Give Yourself a Pat on the Back

Give Yourself a Hug

"squeeze"

Seal of Approval

"clap your wrists and bark like a seal"

Excellent!
(Air Guitar)

"play it—bend those knees"
"bounce to the beat!"
"go down on one knee!"

Awesome

"slow bow"
"awesome" (deep, quiet voice)

Yes! Yes! Yes!

"Yes!" elbows to the ribs.
Yell "Yes!"
one arm, the other, then both

—Artwork by Cynthia Whalen

Fig. Closure.3

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Double Entry Journal

Name: Date:

Grade:

Topic:

Initial Observation	Upon Reflection

Reflective Lesson Log

Name: Date:

Grade:

Topic:

Key Ideas from this discussion

Connections I can make with other ideas

Questions I still have

Problem -Solving Log

Name: Date:

Class:

My problem is...

1. I'm stuck on... choosing a thesis statement for my research paper

2. The best way to think about this is....
writing a statement that states my opinion

3. Something that is similiar to my problem is... my senior year research paper

http://www.state.il.us/kids
Treasure Hunt

Directions: You and your partner will type in the above URL. See how many of these answers you can find together. One of you can do the odd number and the other can do the even number questions.

1. What is the name of Governor Jim Edgar's wife?

_____

2. What is the name of our state flower?

_____

3. When did Illinois become a state (month, day and year)?

_____

4. Besides Abraham Lincoln, name a president that once called Illinois his home?

_____

5. What does the name Illinois mean?

_____

6. Where was the first capitol building located?

_____

7. The second capitol building was located where?

_____

8. Name the three branches of government in Illinois.

_____ _____ _____

9. Which of these branches is headed by the Governor?

_____

10. Which job in the executive branch is responsible for issuing all of the driver licenses and license plates?

_____

11. Name the state animal.

_____

12. What is our state bird?

_____

13. Illinois even has a state dance. What is it?

_____

14. The Illinois flag was created in a contest that was sponsored by the Daughters of the American Revolution. How much was the prize?

_____

15. Our state tree used to be the Native Oak tree. In 1973 it was changed to what tree?

_____

16. What are the names of Governor Edgar's two dogs?

_____ _____

Answers to the Illinois Treasure Hunt

1. Brenda Edgar
2. Violet
3. 1818
4. Ulysses S. Grant
5. Tribe of Superior Men
6. Kaskaskia
7. Vandalia
8. Executive, Legislative, Judicial
9. Executive
10. Secretary of State
11. White-tailed deer
12. Red cardinal
13. Square dance
14. $25.00
15. Emy and Daisy

Scholastic Network Treasure Hunt

Go into Netscape Communicator
type in: www.ScholasticNetwork.com

User name: **RESPECTWIS**
Password: **washington**

1. Name the author who will do a live interview in the "Auditorium on January 21 _____.
2. What's the name of the first author in the Author Library?_____
3. How many Iditarod races has Martin Buser been in?_____How many has he won?_____
4. Name a black baseball player who was a "trailblazer" in **Breaking the Color Barrier.**_____
5. What does Jack Prelutsky like to write?_____
6. What's the 'Dirtmeister's" real name?_____
7. Why are sea turtles called leatherbacks?

   _____
8. In Max Math Adventures, how old is Max?_____
9. When was Amelia Earhart born?_____
10. Is the red wolf bigger or smaller than the gray wolf?_____

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Getting on Scholastic Network is easy!

1. Log on to the Internet
2. Type in the Web address
   `http://www.ScholasticNetwork.com`
3. Click the "Enter Scholastic Network" button.
4. Enter your User Name and Password, and click "OK."

Our User Name is:

Our Password is:

(Write in the personal User Name and Password that you choose when you activate your account.)

Congratulations! You're online with Scholastic Network!

89

Copy this easy step-by-step guide and post it near your Internet-connected computers. 0439-06078-8

Classroom Management Options	Research Options	Authoring Options	Publishing Options
* team-up with Learning Centers * stations * small groups * team teach * plan, prepare, organize * not all R.A.P. * keep simple * fit to what already doing * not just technology	* books, magazines, etc (printed materials) newspapers brochures almanacs encyclopedia * posters/pictures * charts, graphs, maps, atlas * songs/choral readings/poems * read-a-longs * t.v. programs * tapes (audio/video) * actual people to share, demonstrate * tech (laser disc, CD Rom, internet) * contact by phone * guided observations * experiments * field trips * interviews * solve a problem * survey	* posters * mobile * video tapes * audio tapes * diorama * timeline * graph/map/chart * technology * drawings, pictures * poems * plays * write songs * model * book * crafts * assemble survey results * project cube * list * journal * diary * postcard * brochure * fact cards * step book * recipe * coloring book * collage * scrapbook * book cover * commemorative stamp * flag/banner * web * collection * story board * exhibit * timeline * choral reading * cartoon **Some options are actually products that result from the authoring process.**	* display * presentations (oral or tech) * internet * orally * multimedia * share with parent/friend * describe or explain a model * make a display * show video tape * read book * describe poster * describe a solution * graphic demonstration * performance * demonstration * role play/skit * pantomime * mask * play audio tape * hang a mobile * cook the recipe * display the authoring w/wo explanation * commercial * time line * news cast * Christmas card * postcard * project cube * debate * trial * outline also see pages 41-47 Project Planner

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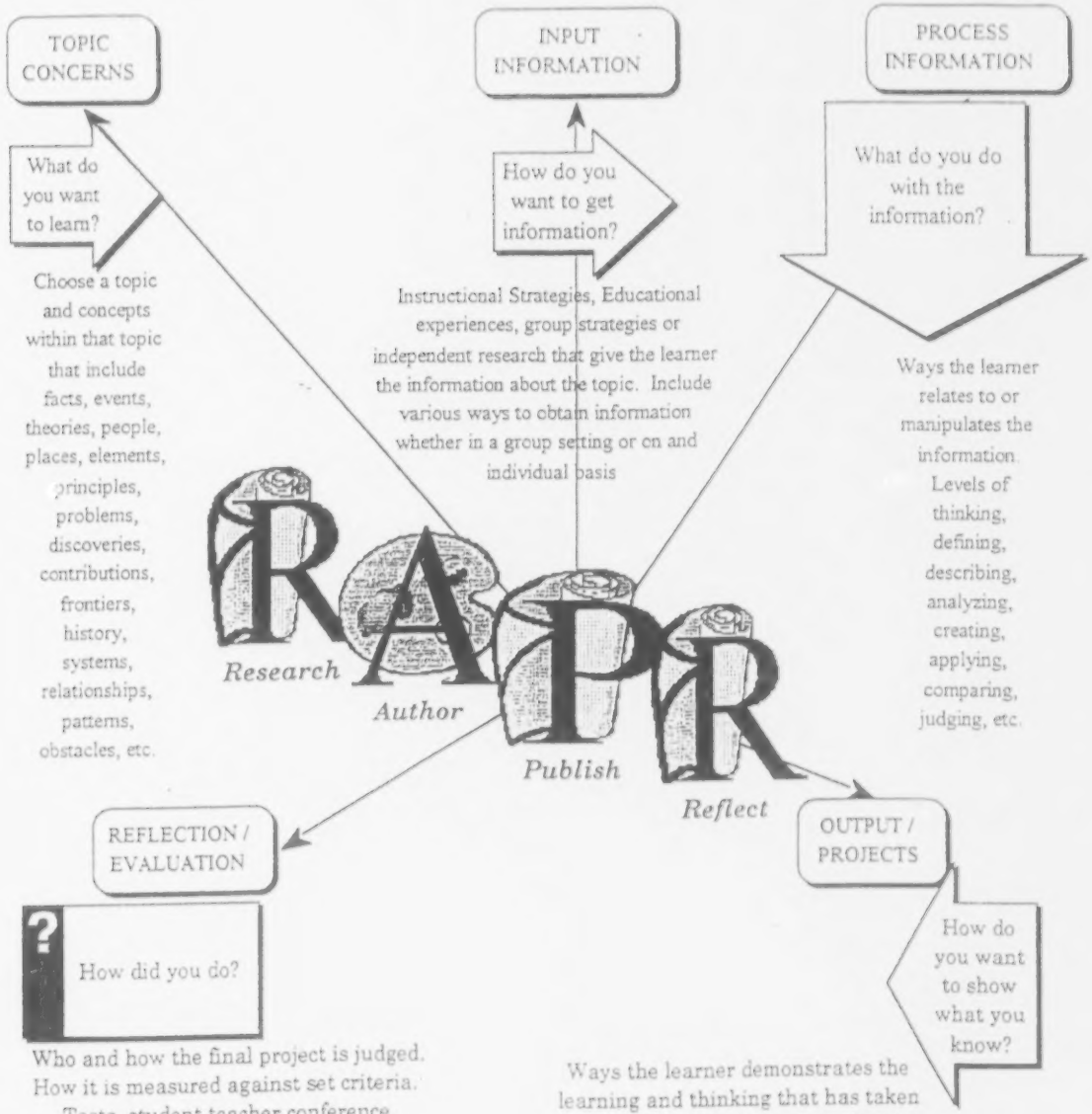
TOPIC CONCERNS
What do you want to learn?
Choose a topic and concepts within that topic that include facts, events, theories, people, places, elements, principles, problems, discoveries, contributions, frontiers, history, systems, relationships, patterns, obstacles, etc.
INPUT INFORMATION
How do you want to get information?
Instructional Strategies, Educational experiences, group strategies or independent research that give the learner the information about the topic. Include various ways to obtain information whether in a group setting or on and individual basis
PROCESS INFORMATION
What do you do with the information?
Ways the learner relates to or manipulates the information. Levels of thinking, defining, describing, analyzing, creating, applying, comparing, judging, etc.
RAPPR
Research
Author
Publish
Reflect
REFLECTION / EVALUATION
?
How did you do?
Who and how the final project is judged. How it is measured against set criteria. Tests, student teacher conference, observation, checklist or rating scale, subjective evaluation by the teacher, self evaluation, situational test, peer rating, etc.
OUTPUT / PROJECTS
How do you want to show what you know?
Ways the learner demonstrates the learning and thinking that has taken place. Worksheets or projects that are vehicles of communication. Performances, written products, artistic products, displays, three dimensional products, graphic presentation, audio-visual presentations, etc.

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Data Bank for Real or Literary Characters

(example for: *Kate Shelley: Bound for Legend* by Robert D. SanSouci)

Lived
Iowa - 1881
Near Honey Creek
By train tracks
On a farm
Near Des Moines River
Clapboard house

Description
15 years old
dark hair
work-worn hands
courageous
responsible
hard working

Has
Little schooling
love of railroads
determination
sense of duty
inner strength
a bridge named after her

What he/she did
plowed and planted
ran the family farm
shot hawks
rode bareback
read a lot
prevented a train wreck
saved lives of two men
made a dangerous journey alone

Related to
deceased father (railroad man)
invalid mother
sister Mayme, brother John
deceased brother James

Remembered for
Making a dangerous journey alone at night in a storm to stop trains from crossing a bridge that was out

Data Bank for Historical Place/Event

(example for: The Alamo)

Location
Texas
Center of San Antonio

Description
Spanish mission, architecture
high walls
small
surrounded by cottonwood trees

Purpose
Built as a mission, 1718
Monastery, church
Religion
Protection
Texans used as a fort

Events
Feb./Mar. 1836
182 Texans held off Santa Anna's army of 4-6 thousand for 13 days
Texans ran out of ammunition
Overwhelmed by Mexican army
All Texans killed except for women and children

People Involved
Lt. Col. William Travis
Jim Bowie
Davy Crockett
Santa Anna

Other Facts
Allowed Sam Houston time to build an army to save the independence movement of Texas

Data Bank for Historical Place

Location

Description

Purpose

Events

People Involved

Other Facts